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# OUTLINES

OF

# SURGICAL DIAGNOSIS.

BY

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# PREFACE.

The Author is fully alive to the objections which may most reasonably be advanced against the arrangement of the following Treatise; yet after mature consideration, it appeared to him the plan best adapted to fulfil the design he had in view; and he has endeavoured, by appending a full and copious Index, to obviate, as much as possible, the inconvenience which otherwise would result from the method pursued.

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# OUTLINES
# OF
# SURGICAL DIAGNOSIS.

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## INTRODUCTION.

To diagnose a malady (*διὰ γίνωσκω*) is to recognize its nature, and to distinguish it from all other affections. The surgeon must possess an extensive and accurate knowledge of the signs by which the various diseases he is called on to treat manifest themselves, and he must also have an acquaintance with the pathological conditions on which these signs depend, before he can exercise the art of diagnosis with scientific precision. If the practitioner does not entertain a distinct idea of the affection to be treated, he is reduced to the alternative of dealing with symptoms; and thus his practice becomes mere routine and empiricism.

The aphorism, "Qui sufficit ad cognoscendum, sufficit ad curandum," though not true in the sense in which the old nosologists employed it, is still not devoid of force.

Although it is certain that the surgeon, in his especial department, does not, as a rule, encounter the same difficulty as the physician in the recognition of the diseases which are assigned to his care, yet there are few duties which he has to perform that are more anxious, and occasionally more difficult, than to discriminate the precise nature of the affection submitted to him. Many surgical diseases of very different kinds closely resemble one another, not only at their outset, but in their progress, and demand much care, judgment, knowledge, and skill to distinguish them. If the true nature of the malady is not recognized, the surgeon may do harm, not merely by failing to do what is requisite for its relief, but also by employing measures which in the ailment that really exists are more or less detrimental. Many surgical affections, from their natural tendency to resolution, demand little or no interference, and these it is only necessary clearly to discern; while others are so totally beyond our art, and are so hopeless in their nature, that when their true character is perceived, we have no small part of the difficulties of the case taken away, seeing that all which can be done is to palliate the more distressing effects. It is beyond doubt the power of discriminating diseases with accuracy which elevates one surgeon above another, and gives to some that apparently intuitive knowledge which is so important an element in the practitioner's character. Truly, "*il y a une chirurgie du diagnostic* non moins difficile à bien faire que les opérations chirurgicales."

The ability accurately to discriminate disease is doubtless to some extent a natural endowment, which is not bestowed on all alike, yet there is no reason to suppose but that by education and practice this faculty can be greatly developed and improved. It would be most discouraging to think otherwise. It is not merely that our senses may be rendered more acute and accurate by practice, but our talents of observation and judgment may, by prudent exercise, be greatly improved and corrected. In order to discern diseases aright, there must be a truthful mind, which takes a just and unexaggerated view of things—sound judgment, which seizes upon, weighs, and compares those features in the case which are characteristic and of value, and excludes those only which are unimportant—clear reasoning powers, to draw just and logical inferences and conclusions without bias—and lastly, patience to unravel and often to wait the development of the phenomena. A ready and accurate memory, too, is most requisite, and that education of eye and ear and hand which renders them acute, intelligent, and ready ministers to the mind. In this way, such a happy power of discrimination may be acquired as will appear a sort of inspiration to the uneducated.

The diagnosis of a disease stands at the very threshold of our inquiries concerning it. In some cases we can recognize the affection at once. Its features are so clearly portrayed, that a glance suffices to reveal its nature, and even its stage of development, to those acquainted with the progress of such maladies. This, however, is far from being a usual circumstance. A long and attentive investigation, and a careful balancing of facts, is more commonly requisite in order to learn the truth.

It is true that the recent advances in physiology and pathology have shed their influence on many of the more obscure points of surgical diagnosis, yet there are so many disturbing agencies at work in the human body—so many fine and inappreciable forces in action, whose influence it is difficult to define—that the pride of our penetration is frequently humbled by being baffled. The great variety of "constitutions" which are presented to us—the powerful influence of "surroundings" on the progress and tendency of a disease—the effect of sex and age, previous history (moral and physical), present state of health, &c., &c.—are frequently difficult to trace, and their influence most difficult to estimate. Such circumstances fall much short of what we term "idiosyncrasy," yet they produce a very powerful individuality. The very season of the year when the complaint is seen, the place where it is treated, the prevailing ailments, and a multitude of other even not so obvious circumstances, exercise in many cases a most decided and important effect on the features of the case.

Further, the coëxistence, commingling, and reaction on one another of various diseases—the conversion or superaddition of one affection into another—the passage by contiguity or continuity or metastasis of disease from one part to another—the influence of past treatment—the "sympathy," as it is termed, of one organ or part with another, with which it is anatomically or physiologically connected—all introduce so many elements of confusion and difficulty, that time, care, tact, experience, and judgment are often called for to unravel the intricate web. Morbid sympathies are frequently far spread in their effects and impossible to explain. At other times the interpretation of the phenomena is not difficult. A connection between organs, of which we were not aware during life, becomes manifest when disease seizes upon them, and thus not unfrequently most anomalous sympathies become accounted for, if not explained. Between the brain, spinal cord, and heart, and all parts of the system, there is the closest and most sensitive connection. The more common and evident of these "sympathies" (most of them reflex) are recognized and known by all, but the less frequent and more obscure often puzzle the practitioner greatly. Irritation in the nerve-centres may in this way give rise to symptoms confined to internal organs, or produce signs of disturbance in one or more of the limbs, or even in a limited portion of a limb; while a peripheral irritation in a limb or an internal organ may make itself known only by the effects it produces on the nerve-centres or on some other part far distant from the original seat of irritation. In this way we may have the cry of distress arising from any of the internal organs only heard or echoed in the most distant parts of the system. The stomach, bowels, kidneys, bladder, uterus, liver, lungs, and general surface of the body, may be the suffering or the exciting cause of ailment; and in order to trace this disorder to its source, and be able to remove it, we must possess knowledge and experience of its nature and effects. It is true that it is in the class of diseases which fall to the care of the physician that these difficulties are chiefly met with, yet in the strict domain of the surgeon they are sufficiently common and powerful.

The surgeon has further to determine, not merely the nature of any affection brought before him, but also to decide in most cases on its stage, the influence it has on the system at large, the organic changes occasioned or caused by it, and so on.

That scientific surgical diagnosis requires an accurate acquaintance with healthy and morbid anatomy is self-evident. To understand aright even the displacement of a bone, we must be aware of its normal position and relations, and how these have been changed. To understand vital symptoms, we must comprehend the structure of the various organs and textures, and their functions in health and disease; and in order to understand physical signs, we must, in like manner, be acquainted with the mechanism of the body, and the laws by which that mechanism is controlled. It is mainly by a verification of our opinions formed at the bedside, and by an inquiry into the causes of the symptoms there seen in the examination of the body after death, that readiness and accuracy in diagnosis is to be acquired; and the more extensive our induction founded on such comparisons, the more valuable will our opinion become.

In most cases, it may be said, that an error in diagnosis is less pardonable on the part of the surgeon than on the part of the physician, as the affections he has to deal with are external (for the most part), and so more open to the investigation of our senses. The different terms of his problem are thus more evident, and the influence of treatment more easily observed. An error on the part of the surgeon in the recognition of the patient's complaint, is also, as a rule, a more serious affair, than when the subject of investigation is one of the ailments which fall to the physician, as most internal complaints tend of themselves to resolution, and expectancy fulfils in any doubtful case the therapeutic requirements. If the surgeon, however, in most cases fails to recognize the true nature of the affection brought before him, and does not interfere in the necessary way, irreparable injury may be done; while if he interfere under a mistaken idea of what he has to do with, he may cause, if possible, still greater injury; take, as an illustration of this remark, not recognizing the true nature of a dislocation, or operating on an aneurism as if it were an abscess.

There can be little doubt then, that if complete accuracy in the discrimination of surgical disease were attained, a surgeon's labours and anxieties would be greatly lightened, and the science he practises advanced both rapidly and soundly. Many false observations would be spared, and thus the infinite harm which such deceptions occasion would be avoided.

It has been already said, that the diagnosis of an affection implies an observance of the vital and physical symptoms which it occasions, and the proper reference of these symptoms to their source or cause, as well as an estimate of their due value. Thus an acquaintance with *Symptomatology*, *Semeiology*, and *Etiology* is implied. The term "symptom," when applied to the phenomena of disease, has reference (according to the phraseology introduced by Laennec) to the perversion of the *vital* function; " sign " to the physical expression such perversion produces; the former may thus be termed a " vital symptom," and the latter a "physical sign." Signs again are termed " sensible " when they are cognizable by our senses, and "rational" when they are recognized by the reason. "Differential" diagnosis is the discrimination of one affection from another which it resembles, by a due estimate of their respective symptoms and signs.

In the investigation of the case we may either pursue the analytical or the synthetical method, *i.e.* either pass backward to the former history of the patient and his ailment, &c., after having first carefully examined his present condition; or begin by tracing downwards the family and personal history, and inquiring into the origin and progress of the complaint, arrive finally at the scrutiny of his existing state.

Again, while in general we recognize or diagnose an ailment, by directly comparing it with any other which may resemble it in its symptoms, yet frequently, and especially in difficult cases, our diagnosis is reached by the indirect method of exclusion, whereby we eliminate one affection after another which has a resemblance to that before us, till by proving *what it is not* we narrow the circle to *what it is.*

In investigating the nature of any disease, there are two great sources from which our information is derived. The one comprehends the interrogation of the diseased or suffering organ, the other the account given by the patient or his friends of the rise and progress of the affection. The first, being tested by our own senses, is less apt to deceive than the second, always supposing our senses are duly educated for the task. Both sources of information are most important, though both are by no means always attainable. If, by accurate observation and a due knowledge of their bearing and significance, the surgeon is able to interpret the objective signs of disease aright, there is greatly less risk of error in the contribution thus made to our information towards the discrimination of the disease, than can well be looked for from the subjective phenomena, which are liable to be distorted by the imagination, ignorance, or wilful design of the patient. Certainly, if judged of aright, "the language of the suffering organ" is least liable to deceive.

In some cases we prefer first to examine the part, and afterwards to inquire into the history of the seizure; at other times it is more profitable to reverse this order of procedure. Frequently we gain the confidence of the patient better, allow him to overcome the little nervousness excited by our visit, and get time to watch his expression, constitution, strength, and those many important details taken in almost intuitively by the eye, when we allow him first to tell us his story before we proceed to examine the part for ourselves. On the other hand, the importance of determining the condition of the part is so clamant, that we prefer giving that portion of our duty the lead. This last remark is especially true of many surgical complaints, where, for example, an injury is the subject of investigation. In the case of children, or lunatics, or persons insensible, or from any cause unable to tell us aught of their complaint, then, of course, we are wholly thrown on the personal examination of the case; while in those diseases which only manifest themselves by functional derangement (as in many of those of the nervous system), without any appreciable lesion, we must be mostly guided by the statement and explanations of the patient.

Again, the full details of the case will comprehend an account of the past history and the present condition. The knowledge of the past we must obtain from the patient or his friends—an acquaintance with his actual state, while partly derived from the same source, will, in general, be mostly obtained from our own examination. When the history of the past is clear, the present condition is often easily understood, and our further investigation much simplified.

In investigating the nature of any difficult case, it is better to proceed systematically, so as, as far as possible, to economize time and obviate repetition, as well as to group our information in the most useful way. We should always try and gain the necessary information in the way least annoying to the patient and most useful to ourselves. In most cases of difficulty it is best to begin by inquiring into the origin of the disease, and trace it down to its present stage, and then turn our attention to examine its character at the time of our visit.

It may be here remarked, that in his interrogations and all his intercourse with the sick, the surgeon must be most kindly in his manner if he wishes to elicit the information he seeks. Patience and tact are often much required in dealing with the ignorant. "To question fitly is the art of a master," says Rousseau. The advice of Sydenham is worthy of constant remembrance, when he says, that the surgeon, in his dealings with the sick, should recollect "that as he is himself not exempt from the common lot, and is liable and exposed to the same laws of mortality, the same miseries and pains, as are all the rest, so he may endeavour the more diligently, and with the more tender affection, as being himself a fellow-sufferer, to help them who are sick." The ignorant are often so conscious of their ignorance, that they are at once confused if questioned sharply; while with all it is desirable to use plain, concise, and simple language, and try by kindness of look and manner to give confidence. We should interfere as little as possible with the patient in his narrative, so as that nothing be suggested to him at first. In putting questions, let them be as much as possible such as only demand a "yes" or a "no," and we must be sure that the question be perfectly understood before the answer is noted. The intelligence, education, and even the prejudices of the patient must be borne in mind, and the questions and mode of examination varied accordingly. When a patient sees, by his apt interrogations, that the questioner understands his business, he will not long withhold his confidence. Frequently, in dealing with the uneducated, it is requisite to keep him from diverging into irrelevant subjects, and this we must do without giving a bias to the recital by suggestive questions. We must avoid forming a hasty and premature opinion, and then directing our interrogations to prove our hypothesis—an error the most conscientious are apt to fall into unawares. The questions must vary in number and order in different cases; but our examination as a whole should be as short as is compatible with completeness. All indelicate questions should be abstained from, and all reference to such subjects as may be considered immodest should be avoided, unless absolutely necessary. In the case of young females, any inquiries of this description should be addressed to the parents. In truth, all unnecessary queries should be eschewed, and the tendency of some individuals to exaggerate their sensations should be borne in mind.

In the pursuance of our task we encounter many difficulties from ignorance, prejudice, wilful deception (which conceals symptoms which exist, or declares others which have no reality), carelessness in observing or noting the early manifestations of disease, or the want of attention caused by the excitement of an accident—all these circumstances frequently introduce elements of confusion and difficulty into our inquiry. Even intelligent persons, from want of observation or accuracy, or preconceived notions as to the nature of their ailment (which notions they are usually very anxious to place in strong relief), frequently fail to give a clear account of their illness. Again, incongruities, contradictions, and inconsistencies in the narrative, are often of great use, as putting us on our guard against deception, or enabling us to eliminate certain points from our mind. Exaggeration and contradiction usually mark the statements of dissemblers; but by cross-questioning, and frequently by the aid of chloroform, the deception can be exposed.

In examining a part, we should never unnecessarily repeat any painful movement or test, after once satisfying ourselves of the point inquired into. The continued rubbing together of the fragments of a broken bone, or the repeated introduction of a probe, after the matter to be decided has been once clearly made out, is the refinement of cruelty.

Again, in prosecuting our examination, we may have occasion to make the patient uncover the affected part and assume various attitudes and postures. All this demands, especially in the case of females, circumspection and delicacy. It is an axiom in British surgery, in examining a female, never to uncover any part of whose normal condition we have no reason to doubt.

Lastly, in prosecuting our inquiries, we will usually find the phenomena group themselves into those of a general and those of a local character. If possible, these should be kept apart, though in our investigations it is very difficult always to do so, they so unite and commingle.

A. Past History of the patient and his disease. The "commemorative signs," as they have been termed, of the disease demand careful attention.

The previous history of the patient, his physical and moral condition, is often most important for us to know. We seek back to the time when he was in good health, and from that point trace his history downwards, learn what ailments he has suffered from—if he ever had a similar attack before—and if so, what the precise nature of that attack was—what influences he has been subjected to—what predisposing and exciting causes of disease he has encountered—and, in short, what bearing the past has had on the present. True, in the case of an accident, such minute knowledge is not always essential to the recognition of the injury sustained; but while an accurate account of the mode of occurrence of the accident is frequently of the first importance, all such knowledge as that referred to above assists materially the proper management of the case. The personal and family proclivity, when known, is often a great aid; and an acquaintance with any previous ailment which may have left germs of weakness behind, or given indications of hidden constitutional disposition, is always of essential moment. An accurate knowledge of the outset of the disease is important, as probably informing us of what the lesion consisted in its primary and uncomplicated condition. In the case of accident, to know how it occurred, not unfrequently explains the whole matter—distinguishes one injury from another—and renders plain what otherwise is inexplicable. How the person fell—what attitude or position he was in at the moment he fell—with what force or with what instrument he was struck—from what direction the blow came, &c. &c.—such information will in many cases clear away all doubt. The previous treatment (if any) and its effect, should also be known, as indicating the character of the complaint at its outset, and, it may be, showing the presence of some other ailment at a previous period. From this source, if available, the most important and valuable aid both for recognizing and treating the complaint may be got. From an acquaintance with the *duration* moreover, and the *violence* of the affection, we form an opinion of its acuteness, semi-acuteness, or chronicity. The *progress*, too, of the complaint—whether continuous or interrupted—whether any symptoms formerly present have disappeared—or what new ones have become developed as the disease advanced—in short, the evolution and stage of the affection—must be carefully noted.

By following out such a line of inquiry as is above hinted at, we gradually fill in a complete map or picture of our patient's life in all points essential to the understanding of his present condition.

It may, however, be proper to dwell more particularly on the various points such a review comprehends.

1. *Family History.* **Hereditary Proclivity.**—It is frequently very difficult to obtain full and reliable information on this point. Many are unwilling to admit hereditary tendency to disease; others omit to tell what they suppose is immaterial; and others are really ignorant of the history of their progenitors and relations. Frequently it is important that we should be made acquainted with the health of more than one generation, as hereditary disease occasionally (as is well known) skips one or even more generations, and appears again in the descendants. To render this point complete, some acquaintance with the healthfulness of collateral branches is also desirable. Hereditary tendencies in some cases are manifest from birth (as scrofula); others (as gout and gravel) may not appear till late in life, and their development may so closely coincide in time with the period of their appearance in the parent, that the age when such disposition showed itself in the parent should, if possible, be discovered. The causes of death of the parents, and of the brothers and sisters, or their state of health if alive; what diseases they have suffered from; whether the patient bears a close bodily resemblance to the dead or diseased members, &c.—may afford us information, not certainly requisite in all cases, but in many instances highly important. A known predisposition to gout, rheuma-

tism, or cancer, will often clear up the difficulties of a case greatly, and assist us to decide in determining on an operation.

II. *Personal History.* (*a*) **Temperament.**—This may or may not be hereditary; but that it indicates a tendency to certain diseases is certain. "Le tempérament est le premier pas vers la maladie," is the saying of a careful observer. A knowledge of it frequently throws great light on disease, especially that of glands and joints. Personal peculiarities, combined with hereditary tendency, give rise to *diathesis*. The surgeon has to do with the *sanguine*, in which the circulation of red blood preponderates, and the tissues are well toned, and the disposition active; the *phlegmatic or lymphatic*, which is the reverse of the last; and the *nervous*, in which the nervous system predominates, and influences more than in health the habits and disposition of the patient.

The bilious, the choleric, and other dispositions are also spoken of; but the three above mentioned are the chief and most important. They may be variously combined. "Nervous" irritable persons are much more easily, and much more violently, affected by disease or accident, throughout their whole system than the phlegmatic. So, too, those whose vascular system is charged more or less than what represents the just medium constituting health. The quantity and quality of blood, the relationship existing between it and the blood-vessels and the heart, have all a most material influence on the health of the individual.

(*b*) **Age.**—An acquaintance with the age of the patient is often of the highest moment in the discrimination of surgical disease.

There are at different ages different tendencies to disease and accident. In the infant the nervous system and nutritive functions dominate the rest. There is great "sympathy" between their various organs and tissues, and their body in a state of *evolution* suffers acutely from any disturbance. In the old, again, the tissues become changed in their intimate composition. Their bodies are undergoing a sort of *involution*, and their textures are diminished in density and resistance, and so liable to a different train of accident. In their circulatory and nervous systems, in their bones and muscles, in the tone and action of their various organs, in the inertness and torpor of their functions, lurk many elements of disease. In them disease frequently shows itself by few of its accustomed symptoms, and the "sympathy" between different parts and organs is greatly blunted or destroyed. Many complaints may coëxist, and the function of the most important organs may occasionally be found gravely affected, and yet little evidence of it be observed.

he age of puberty, again, is marked by certain morbid dispositions, especially in the female; while, if undisturbed by evil habits, adult age should present the even balance of the functions, the perfect growth, development, and cohesion of the textures, and so exhibit the least tendency to disease and accident.

Age not only exercises much influence on the development of certain ailments, but predisposes to certain accidents. A blow on the shaft of a long bone near a joint will probably separate the epiphysis in the young, cause dislocation in the adult, and fracture in the old. Certain fractures occur almost exclusively in the old; and certain growths appear, usually by choice, at determinate periods of life. True aneurism is very rare before thirty, and almost unknown before puberty. The liability to cancer increases from youth upwards, undergoing a great augmentation after forty. Hereditary disease is frequently developed at certain ages, and never at another.

(*c*) **Sex.**—The development, activity, and decline of the generative functions in the two sexes lead to very different effects. In the female, in particular, they produce a very important influence. When menstruation is becoming established, and during its decline, it deeply affects the female organization. It frequently gives a type to all her ailments. At these periods, and particularly during its disappearance, she is especially liable to growths, simple or malignant. In the male, disease is most apt to fall on the muscular and locomotive systems, the heart and the brain. In the female it is especially in the nervous system that symptoms of disease or disordered function exhibit themselves. Being more impressible and irritable, the female suffers more violently from even slight ailments and accidents; and being more under the dominion of the emotions, females are especially liable to suffer from influences which appeal to the feelings. The professions and employments, too, of either sex being different, introduce further features of distinction into the diseases and accidents to which they are respectively obnoxious.

The male is more liable to aneurism, inguinal hernia, epithelial cancer, paralysis of the limbs and bladder, chronic rheumatic arthritis of the hip-joint; and the female to scirrhus, femoral hernia, rheumatism of the smaller joints, intracapsular fracture of the hip, Collis' fracture of the radius, and to the whole class of simulated disease. In some cases the knowledge of the patient's sex would of itself lead us to surmise the nature of the ailment; as, for example, what a different idea we would form of the nature of retention of urine in a female and a male, or of paralysis of the limbs in a young woman and a young man! In the case of the female, then, it is often necessary to inquire into the state of the catamenia; whether the patient be married and has borne a family, &c.

The influence of sex, moreover, in the transmission of disease from parent to child is well known. It is seen in many surgical affections, such as harelip, the hæmorrhagic diathesis, club-foot and clubbed fingers, luxation of the hip, supernumerary fingers and toes, colour blindness, &c. Mental disease, too, is often observed to pass from relation to relation on one side of the house alone.

(*d*) **Occupation** is frequently a powerful predisposing and exciting cause of disease. Many trades are sources of special ailments or forms of disease, from the deleterious agencies employed or set free (chemical, gaseous, vaporous, pulverulent), the posture they entail, the confinement or undue exertion they necessitate, the impure atmosphere, or unhealthy temperature, or want of light, in which they are carried on. The fatigue and exhaustion may be more mental than bodily, but the system as a whole suffers, being either rendered morbidly sensitive, or directly forced into actual disease. There are peculiar risks connected with almost every trade, but some are infinitely more pernicious than others. It may be said generally, that other things being equal, the greater the strain on the muscular system, and the more the exposure to the weather which attends the occupation, the greater the wear and tear to the constitution, and the more surely will the patient break down under the ordeal of sickness or accident. By being acquainted with the trade or occupation of a patient we may often be able to determine a diagnosis otherwise obscure. The development of the limbs, not merely as to girth, but also as to length, is in some cases manifestly influenced by certain occupations, which, from early life, exercise one extremity more than the other. Thus one leg may exceed the other in length, in those continuously working a wheel with the one foot; and while, in the case of smiths, cutlers, and jewellers, the right arm is occasionally seen to exceed the left in length, the left is said sometimes to be prolonged in painters on porcelain.

(*e*) **Habits** act chiefly as predisposing causes of disease, but they may also be exciting causes. Habit has been said to become a second nature, and certainly it cannot be overlooked in any investigation of disease. Active or sedentary habits, temperance in eating and drinking, the excessive or constant use of deleterious agents, such as tobacco or opium, the ingestion of food which is injurious or insufficient, &c. &c. Of all habits probably the excessive use of intoxicating liquors exercises the most powerful influence on the complexion and type of disease.

(*f*) **Moral Condition.**—Sometimes a morbid bodily condition of great moment may depend on a mental harass—grief, chagrin, disappointment, suspense, passion, or other mental state—these, if known to be present, will often explain what otherwise is inexplicable.

(*g*) **Place of Residence** has frequently a great influence on disease, and is well worthy of note in investigating the nature of such disease. The climate in which the patient has lived, whether characterized by extremes of heat or cold, or sudden transitions of temperature; places which are marshy, exposed to noxious effluvia, damp, or too endemic influences of any kind; houses which are defective in construction, ventilation, or drainage—all these circumstances are powerful modifiers of disease. Surgical disease often obtains its complexion from such events. The diseases of a man inhabiting a dry, wellaired, well-lit house, in a high and healthy locality, are usually very different from those seen in another living in opposite conditions, as in the cold, dark, damp cellars of a great city. A previous town or country residence is always worthy of remark.

Lastly, it may be observed, that recent exposure to hardship and want, if proved to have existed, is important, as tending in not a few cases to guide our judgment in deciding on the character of a complaint.

B. Present Condition.—We often gain at the first glance much information concerning our patient, whether he be in bed or afoot. In the outdoor department of an hospital how much is frequently learned of a person as he walks towards you! The gait, attitude, expression, all tell their tale. Sometimes a mere falter, or twitch, or look, or tone reveals a history.

When a patient is in bed we carefully observe his *decubitus*, and whether he lies quietly and tranquilly, or tosses about, or performs certain ever-recurring movements. The *attitude* assumed by a patient is often very expressive. It may tell of much lassitude and exhaustion, or great irritability and pain. When the patient lies supine, the limbs bent, and the body gravitating downwards, so that he sinks towards the foot of the bed, we know that the powers of life are low, and we take as a favourable sign the first spontaneous attempt to vary or rectify this position. In many complaints the decubitus, as is well known, is peculiar and characteristic, and should be observed and noted. In inflammation of the chest, heart, liver, peritoneum; in embarrassed respiration, in effusions into the pleura, in cerebral irritation, in tetanus, and many other complaints, an attitude is assumed which is very characteristic. The restless tossing of pain and delirium, and that following the excessive loss of blood, strikes us at once as we approach the sick-bed.

In many accidents too, as fracture of the clavicle, dislocations of either extremity, diseases of the hip, fracture of bones, &c., the attitude of the patient is in general quite distinctive.

Again, the *countenance* is often an index of the state of both body and mind. In its lineaments and general expression we can frequently get an insight into the state of the circulatory, nervous, and respiratory systems, and learn much of the mental and physical condition of the patient. This is especially true of children, and in them the expression of disease is often best seen just as they are wakening from sleep.

The *diathesis*, or temperament, of the patient, is sometimes legibly written on the countenance, so that as we approach the bed, and especially as we interrogate the patient, we obtain information of the greatest moment. Exhaustion, pain, emaciation, anxiety, here leave their signet, and not unfrequently the complaint and its very stage may be accurately surmised. How clearly do asthma, phthisis, chlorosis, cancer, organic disease of the heart, lungs, and kidney, epilepsy, apoplexy, scurvy, scrofula, mental affections, hysteria, jaundice, purulent infection, and the whole class of eruptive diseases, show themselves in the face! The cicatrices of old complaints—paralysis—the arcus senilis—the suffused flush of fever—the unilateral flush in pulmonary inflammation of one side—the startled look of delirium and mania—the heavy congested face of the drunkard, and those suffering from pressure on the brain, or from cardiac obstruction—the downcast timid expression of those whose nervous system has been exhausted, especially if by their own vice—the white puffy face of fatty kidney, and the sallow complexion of waxy degeneration of the same organ—all these are suggestive. It is in affections of the brain, especially, that the face is instructive. In the expression of the eye, mouth, nostril, eyebrow, and cheek, characteristic indications are found. The state of the pupils, whether contracted or dilated, equally or unequally, one or both, sensible or not to light; fixed or oscillating; of increased or diminished lustre, glazed, squinting, protruded, sunk (one or both), &c., &c. The eyelids, and eyebrows too, occasionally teach us something. Their motion, fixed expression, &c. The presence of puffiness, or drooping, or paralysis of the eyelid, often tells us much of heart or kidney disease, or exhaustion, or brain affection. The contracted or frowning eyebrows have their tale. The nostrils in their rapid action point probably to tracheal or pulmonary obstruction. The mouth is in many internal complaints highly expressive. The tumid lip in scrofula and (to some extent) in worms—the retracted lip and exposed gums in inflammation of the diaphragm and other abdominal organs, and in tetanus—the blue or red line on the gums, their sponginess, or their being covered with sordes—the formation of the teeth in scrofula and hereditary syphilis—the character of the saliva as indicative of disease of the jaws, tongue, or throat—these, together with the state of the hair, and the general air and mien, convey, often at a glance, to the educated observer intelligence of the greatest interest and moment. The surgeon is thus able to read in the aspect of his patient, and independently of that patient's will, much of the mental and bodily history of his condition, and in cases of attempted deception, no less than in imaginary or exaggerated complaints, he gains information which must greatly aid his further research.

The state of obesity or emaciation is generally best judged of at an early stage of our interview, before we become accustomed to the patient's expression, although it is not always in the face that the emaciation which attends thoracic and abdominal disease is most evident. A pinched face is, however, always expressive, and in the colour and aspect of the whole we are frequently able to read the evidence of bad hygienic conditions as to air, light, food, cleanliness, &c., all of which it is instructive for us to observe. In the tone of voice and mode of answering inquiries, in the way in which the hand is extended, and in the grasp and feel of that hand, we can, in many cases, surmise much as to the condition of the patient and the ailment he is afflicted with. But let us pass from this.

In the further pursuance of the case, we may either follow an anatomical or physiological order. The former is the simple topographic method, beginning at the head, and so successively examining all the members and organs of the body; the latter aims at investigating each set of organs with their apparatus which conjoin to accomplish any determinate function. Objections may be advanced to both methods, and neither has much advantage over the other. It is not necessary as a rule for the surgeon, from the nature and limits of those affections which fall to his care, to enter so minutely into an examination of all the organs, as it is for the physician.

At the outset of our examination, then, we will observe whether the patient is emaciated or not—whether there are any traces of dropsical or other swellings—what is the condition of the muscles, *i.e.* whether they are flaccid and wasted or firm and large—whether there is wasting or swelling of a local or general character, and so affording indication of disease in the part, or in some internal organ. We will notice the condition and appearance of the skin and the presence on the surface of petechiæ or vibices, as indicating depressed vitality and a low crasis of the blood—any peculiarity to denote organic disease, such as clubbed fingers, incurved nails, &c. The state of the hair, too, may attract attention. It may be absent, or thin and dry, and hint to us the existence of syphilis or long-continued gastric derangement, or chronic disease of some debilitating kind, &c., &c.

In general the first question put to a patient, in order to elicit his present condition, is, What do you complain of? Where have you pain? and from this as a starting-point we proceed to trace out the case. True, pain is very often a fallacious guide, and may indicate very little; but it is, at other times, a leading and characteristic symptom, and we must, by our further research, determine its true value in the special case before us.

In our examination of the patient, we actively employ all our senses, and that, it may be, aided by special instruments. The information one sense fails to supply may be got from another, and the knowledge obtained from one is corrected and supplemented by the rest. While eye and ear are constantly employed, and taste and smell frequently used, tactile sensibility is especially the surgeon's sense, and demands his most diligent cultivation. By the portals of all the senses the elements are supplied on which the mind is to exercise its judgment and draw its deductions.

A. By the Eye we judge of Form, Colour, Dimensions, Relationship, Axis or Direction, Transparence, Movements.

In forming our opinion on any of these points, we sometimes contrast the state of the part with what we know to be its normal condition, sometimes with the state of the corresponding part or member. In judging too of many of these questions, we supplement and correct the sense of sight by that of touch. In order to assist the eye in diagnosis, various instruments are employed—the lense, the microscope, the laryngoscope, the ophthalmoscope, specula of various kinds, reflectors, &c., &c. Some of these are used in examining parts "in situ," others for exploring the nature of secretions, excretions, parts which have been removed or extruded, &c.

It is necessary in all cases to determine the non-existence previously of any abnormality in the part we have our attention specially turned to, otherwise grave errors may be committed. How much that exists arises from old accident or disease (fracture of a bone or disease of a joint, for example), must be determined when inquiring into the nature of any displacement, deformity, or embarrassed function. In all cases when comparing corresponding parts, the utmost care must be taken to place them scrupulously in similar positions—to put the trunk straight, and the parts to be compared in a corresponding posture.

**Form.**—From the shape or contour of a part we often learn much. Occasionally we are even able at once to declare what is wrong, from observing the change of shape alone. To do this with accuracy demands, of course, a knowledge of the *normal* shape or form of the part. *Deformity* may be congenital or it may be accidental, and is usually occasioned by displacement. Enlargements, or wastings (phlegmasia alba dolens); œdema from any local cause, or from an affection of some internal organ; wasting from disease; pressure, &c., &c.), dislocations and fractures of bone (when the displacement causes deformity in the transverse diameter of the limb, we know we have a fracture to deal with which is little if at all oblique, while, when the alteration of form shows that the displacement is as to length, we are almost certain that the fracture is oblique), rupture of parts, disease of bone (as the spine and joints), growths, &c., &c. In recognizing the nature of tumours, the shape is often of great importance, and in strangulated intestine the position of the obstruction may occasionally be surmised from the shape assumed by the abdomen

**Colour** (1) of the general surface.—Discoloration of the general surface may tell us much of the condition of the circulation or the retention of products which should be thrown out. We recognize the effects of hæmorrhage or anæmia, the existence of pyæmia, malignant disease, leucocythemia, jaundice, the presence of inflammation, erysipelas, syphilitic or scorbutic stains, or eruptions, &c., &c.

(2) Affected part.—Erythema, congestion, frost-bite, gangrene, ecchymosis, inflammation (in stripes) of veins and lymphatics, the character of certain swellings and tumours (varix, nævus, malignant disease, &c.), the nature of cicatrices; the character of hæmorrhage, whether arterial or venous, and often too the cause giving rise to such bleedings, as when the blood assumes a brick-dust colour in scurvy or in deficient ventilation. *Ecchymosis* is often a most important condition, as conveying instruction to the surgeon. It shows where violence was applied, and gives a fair estimate of its degree and direction. In cases of difficult diagnosis, between dislocation and fracture, the amount of blood effused into the subcutaneous cellular tissue is, as will be afterwards seen, an important guide. In dislocation of the humerus and fracture of the surgical neck of that bone, the fact that the discoloration is on the inner side of the articulation in the former, and on the outer side in the latter accident, is often a most efficient aid in their differentiation. So too, in an attempt to decide the place of disjunction, in fracture of the neck of the femur, much help is got by observing where the blow was struck, its force and direction. Again, discoloration of the hand in injury of the shoulder sometimes leads to a clear knowledge of the nature of the accident; and the ecchymosis of the eyelids (passing back into the orbit) after injury of the head gives us a hint of the probable state of matters within the skull. The discoloration of certain places to which the blood may gravitate often indicates injury of deep parts. The colour of a wound or of a part too may not only inform us of the condition of that wound, or part, but also of the whole system. Further, when pressure is applied temporarily to a part, we see, by its effects, the activity of the capillary circulation in that part, and so gain information of importance.

**Dimensions.**—Increased by effusions (fluid or air), hypertrophies, and displacements; and diminished by atrophy, absorption, and it may be by certain displacements. In lateral displacement of the fragments of a long bone, the girth of the limb is augmented; and its length is diminished when the fragments "ride." In *morbus coxæ* the dimensions of the hip and the length of the corresponding limb are increased at one stage, and diminished at another. In inflammatory effusions the size of a limb is augmented, and in certain lesions of its nerves it is diminished. The bulging of the chest in effusions; the enlargement of the abdomen in tumours or effusions; the elongation of the penis (occasionally) in calculus in the young; the changed length of the limb which is broken or dislocated, are further examples of varied dimensions. It must always be remembered that there may be a congenital or acquired difference in the dimension of the limbs (both upper and lower), or other parts, and that the change which we recognize may have resulted from an old accident or disease, and not from that we are at the moment investigating. It is always most important, as was before said, to know the antecedent state of a limb which has met with an accident. Take as an example a fall on the trochanter, in the case of a person who has suffered from chronic rheumatic arthritis. There is deformity (shortening and swelling), pain, and loss of function, and it may be even roughness felt on motion, and unless we know the previous history of the case, we would be apt to conclude that there was fracture present, when in fact old disease, combined with contusion, explained the whole case.

**Relationship of Parts.**—The relationship of a limb to the trunk and to its fellow, also the relation subsisting between different parts of a limb, should be carefully studied. The knowledge of the exact relationship existing between processes of bone, in the neighbourhood of a joint, is most necessary to us in examining dislocations.

**Axis or Direction.**—In fractures, dislocations, diseases of the spine, &c., an observance of this point communicates needful instruction.

**Transparence.**—In affections of the eye, in certain growths (as cysts and some colloid cancers), in collections of fluid as hydrocele, spina bifida, and occasionally in hydrocephalus, hydrocephalocele, &c., this has to be noticed.

**Movements.**—*Normal* movements sometimes suppressed, as in fracture and dislocation—embarrassed, as in affections of the eye, injury of bone, muscle, tendon, or nerves. *Abnormal* movements (in place or kind) in fracture, aneurism, intracranial tumours, growths placed over great blood-vessels, in some malignant diseases, in obstructions of the bowel, &c. The muscular movements of the body generally may be deranged, or only those of a limb. The movements may be tremulous, uncertain, spasmodic, rapid and excited, uncontrollable, &c. Certain automatic movements of the hand, when a patient is semi-conscious, may lead us to an acquaintance with the part injured. The picking of the bedclothes, the grasping at "*flocci volitantes*," or imaginary figures, all tell their tale. In examining doubtful movement in a tumour, the placing of a stain of ink or a wafer upon it will often make such movement more easily distinguished. The movements of a part have frequently to be tested by the surgeon himself communicating such motion as he wishes to see the effects of. Such "communicated movements" are highly instructive. Sometimes we cause the patient to perform certain muscular actions, so as to test the effects thereof, &c. In this way we cause him to swallow, in order to test the connection of a tumour, in front of the neck, with the windpipe, and so on.

B. By the Touch we obtain a knowledge of Consistence, Temperature, Movement, Specific Gravity, Dimensions, Connections, and several Special or Peculiar Characters. We also employ the touch to determine the degree or kind of sensibility existing in a part. In inflammation of tissues and organs, touch augments the pain; while in sympathetic pains, it usually relieves it. In certain tumors of the scrotum, we are able to gain much information by observing at what part (if any) the peculiar sensation produced by pressing on the testicle is caused; but in these cases we must have the patient's aid to determine the information to be derived from the exercise of our touch. It is in a great measure in the acquisition and careful cultivation of the "taetus eruditus" that the surgeon of experience and observation excels. In many cases it is requisite to know *how* as well as *where* to touch, before we can detect a nice distinction between, it may be, very different conditions.

**Consistence of Parts** is altered in most surgical maladies. They become indurated or softened, and variously changed. In being able to detect different *degrees* of hardness or softness much often depends. Take as a familiar example the distinction between inflammatory engorgement and real induration in the two kinds of chancre; or the contrast between an enterocele and epiplocele in rupture; or the difference between elasticity and fluctuation in tumours. The educated finger easily detects shades of difference in the consistence of growths which are so minute as to be all but inappreciable to the uninitiated. From the hardness of an exostosis to the softness of a superficial cyst, or a pointing abscess, there are many degrees; and in many cases these degrees communicate to the hand their own characteristic sensation.

In investigating a very large proportion of surgical diseases, an estimate of the consistence of the part, and of its depressibility also in many cases, has to be made. In the different stages of inflammation, in tumors, displacements, collections of air or fluid, &c., &c.

"*Fluctuation*" is a condition the surgeon is often called on to examine, and it demands careful definition. It is a term applied to that equable movement in all directions which we observe in fluid, and it is easily mistaken by the ignorant or careless for other conditions, especially elasticity. When we press on one part of a mass of fluid contained in the tissues, an oscillation, or even a projection, of its constituent elements will take place on the side opposite to the part pressed; and this movement will be equal to the degree of pressure applied, and is due to the incompressibility of the fluid. It is apparent that the distinctness with which this character of fluctuation will reveal itself in any given case, will depend greatly on such conditions as the following: The amount and fluidity of the liquid; the depth at which it lies from the surface; the compactness of the overlying tissues, and the thickness of the sac immediately containing it. When there is little fluid, and it is thick, when the parts over it are abundant or dense, and the sac compact, inelastic, and distended, the recognition of fluctuation may become not only difficult, but impossible. In ordinary circumstances, where there is a considerable amount of fluid, perhaps the best way to develop fluctuation is to lay the open hand over one side of the collection, and gently tap with the finger or fingers of the other hand on the opposite side. At each stroke an undulation—a little wave, as it were—causing a vibration, will be felt by the hand at rest; and thus we obtain the sensation of fluctuation. Not only is no force required, but the application of force destroys the effect. It is, however, only in large collections, where the walls of the sac are thin and supple, and the fluid rare, that the above mode of testing fluctuation can be applied. In the abdomen the presence of fluid is frequently easily made out by running the finger rapidly along the surface. In the mamma, where we have much natural elasticity, and where it is frequently desirable to detect the presence of a small quantity of pus at an early period, it is best to grasp the gland with the left hand, so as to render it tense and prominent (just as we do the scrotum before puncturing it in hydrocele), and then laying one finger of the right hand on the prominent portion, tap gently at some little distance with another of the fingers of the same hand, taking care not to confound the sensation communicated to the *pulp* of the finger with that coming to the *side* of the finger from the mere elasticity of the parts. In examining small collections deeply placed, it is best to press alternately with the points of the fingers of each hand applied perpendicularly to the surface, and at as great a distance as possible apart. As the one hand is depressed, the other is pushed outwards by the displaced fluid, exercising an eccentric pressure towards the walls of its cavity, and thus communicating to the passive hand the peculiar sensation sought.

If the tissues covering the fluid are œdematous, firm pressure must be applied with the hand or finger, in order to disperse the overlying fluid before we become sensible of the fluctuation below. In special situations, as in abscess behind the pharynx, one finger alone can be employed, and it is by the feeling of rapid rising under the finger, after pressure has been quickly applied and then demitted, that we know fluid lies beneath. In post-pharyngeal abscess, the firm resistance of the vertebræ enables this mode of exploration to be carried out.

When there is a thick layer of muscle over the fluid, we should press the pus in the axis of the muscular fibre, otherwise the lateral displacement of the muscle may give a sensation which will mislead. It is difficult in words to convey the import of the distinction between "*Elasticity*" and "*Fluctuation*"—a distinction which is real and important, though frequently overlooked. The elasticity observed in white-swelling, and in fungous growths in joints, and even the elasticity of muscle, has been often mistaken for fluctuation. There are certain regions where the elasticity of muscular tissue is most apt to be confounded with fluctuation. In the outer and inner aspect of the upper part of the thigh, and at its lower and inner surface just above the internal condyle; in the calf of the leg; the upper and outer part of the forearm, and the dorsum of the hand when swelled, may be here especially mentioned.

When we press with one hand on a tumour that is merely elastic, we at once appreciate its degree of elasticity by observing what amount of force is required to keep the part pressed on from rising; and if, while the said pressure is maintained with one hand, the other hand is made to press on a distant part of the growth, it will be observed that the outward force acting on the first applied hand (tending to raise or push it outwards) will not be augmented by the application of the second hand. Again on pressing perpendicularly with the fingers on a part that is merely elastic, the hand will be pushed outwards by the rising mass (so soon as the pressure is discontinued) much more rapidly and powerfully, and with altogether a different sensation, than that perceived when fluid is present, except in such exceptional cases as when the sac is greatly distended; but in that case there will be lateral undulation on gentle percussion, which is not present in the case of merely growths. If force is employed in our examination of a case, then the tumor may be pushed aside "en but that is a different affair.

ature.—The hand is sufficient in most cases to give d information; but if an accurate estimate of the temperature is wished, the thermometer should be used. Clinical instruments are now made specially for the purpose of such investigations, but it is in the examination of internal ailments—fevers, inflammatory affections of the chest and abdomen, the exanthemata, &c.—that their use is most important. It is now well known that nearly all internal complaints present special degrees of temperature, and that by recognizing these much advantage is obtained. It is seldom that the surgeon requires great accuracy in determining the temperature of the complaints he is called on to treat.

(1) *Temperature of the general surface* is elevated in fever, or when irritation is present. Heat of surface, with dryness, is characteristic of fever; while heat with moisture is of comparatively little moment. Coldness of the surface, with moisture, is present in collapse and prostration; coldness and dryness usually mean little. Rigors are always of serious import. They may mark the occurrence of ague or other fever or inflammation, or be indicative of the formation of pus in the tissues or cavities of the body.

The state of the general temperature is best determined at the præcordium, mouth (beneath the tongue), anus, axilla, and groin, and in the hands and feet. We can well judge under ordinary circumstances of the circulation, by examining the extremities; and by the degree of firmness or tremulousness of the hands, we have a certain rough test of the patient's strength. In organic disease of the heart—in disease of the mesentery and bowels—and in paralysis—the heat of the extremities is depressed. Sometimes an elevated temperature is accompanied by such perspirations as are distinctive, as in rheumatism (acid, sour), and hectic (profuse), &c., &c.

(2) *Temperature of a part*, *Elevated*, in local inflammation, as abscess, carbuncle, and lesions of certain nerves; *lowered*, in gangrene, arterial and nerve lesions, and below the point ot obstruction in plugging of an artery.

**Movements.**—These may be (1) inherent to the part, as the pulsation of an aneurism, or they may be (2) communicated to the part by the surgeon.

(1) Not to speak of the movements of the heart and bloodvessels (pulse), we have frequently to determine the character

of movements existing in tumours, such as aneurisms, soft cancer, pulsatile bronchocele, intracranial tumours, pulsatile empyema, erectile tumours, the fremitus in arterio-venous communications, the movements of a foreign body in the windpipe, and occasionally the movements in obstruction of the bowels.

"*Pulsation*" is an interrupted throbbing sensation, familiar to all in the beating of the heart and pulse. It may be directly communicated to the hand, as when we examine an aneurism lying near the surface; or it may be transmitted indirectly through various overlying tissues, as when a tumour is upheaved by an artery lying below it. These two kinds of pulsation—the excentric intrinsic pulsation, and the mere upheaving communicated pulsation, are very different, and require to be carefully distinguished. When the pulsation resides in the artery, or a tumour in direct communication with the arterial current, the pulsation is expansive, centrifugal, excentric—radiating from the centre outwards to the circumference. When the hand is placed so as to cover such a tumour, it is felt to swell, throb, pant, expand under the hand, subsiding between each effort of the arterial current. The fingers are to some extent separated in its enlargement. If we put a finger on either side of the tumour, it will be found to bulge laterally, *i.e.* transversely to the course of the vessel. When again the movement is only borrowed, it is a mere heaving, or rising and falling " en masse " of an inert body. The fingers placed on the sides of the tumour, are pushed from the surface on which the tumour reposes, but not from the centre of the tumour itself. There is a motion *of* the tumour not *in* the tumour. By grasping growths lying over arteries, and raising them up clear of the moving power, we arrest the pulsation in them. We cannot do this when the movement is resident in the mass itself. We may, in the case of very projecting aneurisms, be able to insert our fingers under them and raise them up, but we cannot then arrest the pulsation.

The "sphygmoscope" and "sphygmographe" render pulsation in any pulse very apparent to the eye, and enable us accurately to study the movements of the heart, and to compare the strength of pulsation in corresponding vessels.

"*Vibration*" *or* "*fremitus*" again requires definition. It is a peculiar thrilling sensation observed in some tumours, as arterio-venous aneurisms, and is in such cases due to the vibration of the sides of the aperture in the artery. Its character varies considerably in different cases. Sometimes it is like the purring of a cat, sometimes it is rougher and more prolonged. It has been likened to the sound made by a fly imprisoned in a paper bag, at other times to the action of a file, or grater, or saw, and so on (see more particularly under *Arterio-venous Aneurism*). Occasionally the patient both feels and hears it, and supposes some insect is inclosed in the part. This sound is continuous, and augmented by certain postures which render the part dependent.

(2) Movements communicated by the surgeon. *Mobility.*—In the case of fractures and dislocations, and also in examining growths, it is of much consequence for us to determine the mobility which exists. One of the chief tests of fracture is obtained by our ability to move the fragments; while fixture or absence of motion, is one of the most important indications of dislocation. In testing the mobility of a tumour we must take care not to move the whole organ or part, but fixing the tissues in which it is placed with one hand, give an impulse to the growth with the other. The *direction* in which movement is possible is also occasionally important, as in neuroma, where we find the tumour only capable of being moved across the axis of the nerve. The *absence* of movement again in anchylosis is distinctive. In determining the completeness of the fixture in these cases, it is requisite carefully to fix the proximal bone before communicating movement to the distal, otherwise we may be wholly misled by the increased mobility assumed by the joint proximal to that affected. Movement again is increased in the relaxation of a joint, or rupture of its ligaments.

There are many other "movements" which the surgeon has to test by the touch, *e.g.* that existing in sequestra, in a hernia (or in fluid collections having a communication with the abdomen), when the patient coughs, &c.

**Specific Gravity.**—It is chiefly in determining the character of growths that this is important, *e.g.* the weight of scirrhus, osseous and fibrous tumours, as compared with other growths. In tumours of the testis and scrotum this criterion is frequently highly useful, as in differentiating hydrocele, hematocele, chronic orchitis, enchondroma, &c. Poising the growth when it is possible to do so, on the fingers, is the best way of determining this character.

**Dimensions.**—It is mainly in examining injuries and affections of the limbs that the surgeon has to examine this, but in the investigation of tumours, effusions into the cavities, &c., it is also occasionally highly useful. By simple palpation we frequently determine the dimensions of a tumour, laterally and in depth, but the use of some of the various instruments constructed for the purpose, or (what usually serves the end with sufficient accuracy) a graduated tape, is requisite in other instances. In taking the capacity of a double cavity like the chest, the same line must be accurately followed on either side, and in all cases certain fixed points must be taken to guide us. In measuring a limb the trunk must be scrupulously placed straight, and the corresponding limbs in similar and favourable positions for the purpose in view. In determining length we choose fixed points (superficial processes of bone are best) to measure from, and use a graduated tape, or merely a firm piece of cord. In the upper extremity the tip of the acromion, the external condyle of the humerus, the olecranon, and the styloid processes, are the best points to choose. In the lower extremity the anterior superior spinous process of the ilium, the trochanter major, the edge of the patella, and the tip of the malleoli should be fixed on. In the chest the centre of the sternum and the spinous process of a vertebra.

Besides the many ingenious instruments invented, to enable us accurately to measure the pelvis and chest, there has been one suggested (see *Medical Times and Gazette*, Sept. 27, 1862, p. 335), for taking the exact degree of curvature of the spine, and one for measuring the amount of muscular contraction (see *Medical Times and Gazette*, July 19, 1862, p. 65). Mayor recommends an instrument like a pair of compasses, having a graduated scale at their place of divergence, for the measurement of the thickness of limbs and joints. We occasionally also use bougies of soft material, in order to measure and give a figure of the abnormal condition of canals—sounds to determine, not merely the presence, but also the size of foreign bodies in cavities, or the dimensions of the cavities themselves. In such cases the instrument used comes to serve as a sort of prolongation of the finger. Acupuncture needles, too, are sometimes used to determine the depth at which foreign bodies lie in the soft parts, and also their size and nature.

**Connections**, normal or abnormal. In the case of tumours it is essential to define this point carefully.

**Peculiar Characters.**—Under this somewhat ambiguous title I would refer to certain characters, recognized by the sense of touch, which do not properly fall to be considered under any of the foregoing heads.

"*Crepitation*" of a broken bone is observed whenever the fragments are rubbed together, either by the movements of the patient or by the hand of the surgeon. It is a rough, large, coarse, sharp, grating sensation (and sound also in most cases) communicated to the hand of the surgeon, and felt in many cases by the patient also. It is only developed when the rough fragments are brought into contact, and if, from any cause, this contact is prevented, then the sensation (and sound) does not appear. If the fragments ride, or are impacted, or do not reach one another, or if any foreign body, as muscle or tendon, intervene between them, then crepitation is not perceived. When the bone is comminuted the crepitation is more peculiar, being like the movement of many loose bodies, as nuts, or pieces of earthenware, in the part.

When the crepitation is slight it has been confounded with the crackle of emphysema, inflamed tendons, or tendinous sheaths, and joints rough from disease, as in chronic rheumatic arthritis, when the cartilage is eroded. However, it is very rarely that the crepitation of tendons, &c., is so loud as to be *heard*, unless special means, such as the stethoscope, are employed to render it more apparent. In the shoulder a certain sensation is produced by the movement of the tendons over the joint, which has been often mistaken for fracture, when from injury to the muscles the movements of the limb have been at the same time limited. The fine, dry, interrupted character of the true crepitation of broken bone, is very different in reality from the jerking, comparatively weak, soft, crackling (not usually apparent to the patient), observed in the affections above referred to. In many cases these false crepitations are very superficial, and resemble the crackling of parchment or a dry bladder. When pressure is applied to an emphysematous tumour, the space over which the crackling is felt is increased, and this often proves a useful test of its nature. A certain crepitant sensation is experienced when we manipulate tumours containing blood effused into the cellular tissue in consequence of a blow inflicted over a bone or near a joint. This sensation is especially noticed near the circumference of these tumours, and arises from the displacement of the fibrine. After a time we can no longer cause this sensation, and if continued pressure is applied the whole swelling may be dissipated. In gangrene, when gas is evolved, a sensation (the true cause of which cannot, in the circumstances, be mistaken) similar to that produced by emphysema, is often observed.

In encysted tumours of bone, when the osseous substance gets much expanded and thinned over the collection, it occasionally comes to crackle when it is pressed upon, like thin parchment or metal. This usually, however, ceases after being reproduced a few times, and this cessation is very characteristic. This kind of crepitation is easily recognized and remembered, after it has been once experienced.

Again, in bursæ and ganglia which are distended with fluid, and occupied by many rice-like bodies, a crepitation is produced by handling, similar in feeling to that caused by pressing on granules of starch or half-boiled rice, or on a ball of dry snow.

Further, in diseased joints, when the ends of the articulating bones have been denuded of cartilage, and are rubbed together, a sound and sensation is occasionally perceived which closely resembles that produced by broken bones, but it is more prolonged, less rough and clear—it is interrupted, broken, and finer.

Sir A. Cooper and others mention "a crepitation" as being occasionally perceived in dislocations, and though the cause may be variously explained, it is in its character dryer, duller (not so sharp) as that of fracture. It is more a creaking than a crepitation, and more continuous.

Finally, when hydatid cysts, lying near the surface, are gently percussed, a peculiar thrill is perceived, which is very distinctive when it can be obtained (which is by no means always the case), and which is supposed to be produced by the contact of the acephalocysts within.

Under this head, I might also refer to the sensation communicated to the hand by necrosed and carious bone, but it will be better to allude to that point afterwards when speaking of these conditions.

In order to aid the touch we employ probes, sounds, bougies, acupuncture needles, &c., all of which will be referred to again.

C. HEARING.—The ear alone, or aided by the stethoscope, and by such information as is elicited by percussion, furnishes to the surgeon knowledge of the highest import, not to speak of the valuable instruction (as bearing on other points, more immediately submitted to him), which the surgeon obtains by the auscultation and percussion of internal organs. He directly learns from the sound of the patient's voice, in various affections, much which guides him to a knowledge of the affection present. We make use of the ear in examining affections of blood-vessels; arterial and arterio-venous aneurisms; erectile, encephaloid, and other tumours; penetrating wounds of the air-passages and lungs; or foreign bodies in the same parts or cavities, or fistulæ therewith connected; air or fluid effusions into the chest or abdomen; solid tumours; or the place of obstruction of the intestine lying in the abdomen, and (as has been pointed out by Gendrin) affections and conditions of the internal ear. By the ear (as supplementing the touch), we detect the crepitation of fracture, emphysema, &c.—we recognize the presence of stone in the bladder, and foreign bodies generally in accessible cavities—we determine by percussion, and the sound so produced, the degree of distension of the bladder—the character of a herniary protrusion (whether bowel or omentum)—by the ear we recognize the passage of air by the eustachian tube into the middle ear, or through an aperture in the drum—we discover the occurrence of such an accident as the entrance of air into a large vein during operation; and so on. In the case of true aneurism, the ear gives us much instruction, besides the mere knowledge of the character of the tumour, as the sound heard varies considerably according to the freedom of communication between the artery and the sac, the smoothness of the opening, the size and contents of the sac (whether occupied by smooth, hard, or soft semi-coagulated clots, or irregular detached masses or bands), according to whether the interior of the sac is smooth, rough, &c., &c. In this way we may have a harsh rasping or a sawing or whirring sound, or a soft blowing note. It is in superficial aneurisms, having little solid contents and a small orifice of connection with the artery, that the peculiar sound is most marked and distinctive.

D. Smell.—I will not speak of the supposed (fanciful) distinction between the sexes, different ages, and affections of different parts of the body, by this sense, because the fact is very doubtful, and, if true, would be of no real service, but the sense of smell is occasionally of use in the recognition of disease, as in gangrene (earthy), purulent absorption (new hay), favus (mousy), rheumatism (acid of perspiration), some cases of suppression of urine and advanced chronic vesical inflammation (urinous), small pox, diabetes, cancer, caries, ozæna, &c. &c. It has been alleged that by smell syphilis, scrofula, the exanthemata, cholera, and scurvy can by the initiated be recognised. The surgeon sometimes, by smell, is able to distinguish the nature of fistulæ and abscesses (as when connected with the air, urinary or fæcal passages, dead bone, &c.) and fluids escaping during operations, as in hernia.

E. Taste.—This sense is of comparatively little use in diagnosis, as compared with the others. The ancients, however, employed it largely in ways hardly now to be credited, not to say imitated. They tested the nature of fluids escaping from wounds and fistulæ, and formed opinions of the character of expectorated and digested matters, &c. &c. Diabetic urine is sometimes even now-a-days tasted. From the *patient's* taste we occasionally obtain some aid in our investigations by thus learning something of the condition of the gustatory function, and the state of the secretions in the mouth, or those coming from the stomach.

Such then is a short review of the employment of the various senses in the recognition of disease. I would next describe succinctly the different points in the general system which demand attention when a patient is clinically examined.

To render our investigation complete, we must review the condition of the Circulatory, Respiratory, Nervous, Digestive, and Urinary Systems.

In many cases this review at the bedside will occupy only a few moments; at other times it will take up much time. Even in purely surgical cases the information derived from such an inquiry is often of the highest moment. The close connection and ready sympathy which exist between the various organs and functions, and the exquisite balance which obtains in health, makes the derangement caused by even a comparatively insignificant part often severely felt by the economy, and it not uncommonly occurs that a prominent disturbance of one part of the system may be purely secondary or consecutive, depending on another less obtrusive condition in a distant part, the connection with, and dependence on which we must trace out. Paralysis of the limbs, from disease of the kidney or bladder, is a familiar example of what is here referred to.

A. Circulation.—We judge of this by the impulse of the heart and great blood-vessels; the color and heat of the surface, especially at the extremities of the body; and by the state of the veins. In all affections in which the general system suffers, the circulation early and surely shows traces of derangement. The pulse in its varying states as to speed, force, volume, compressibility, regularity, &c., affords most important and necessary aid regarding the action of the heart and the state of the system at large. We easily recognize the rapid, soft, or small and weak pulse of fever; the less rapid and firm full pulse of inflammation; the intermittent pulse of functional gastric derangement and in organic disease of the brain, lungs, heart, and great vessels; the small, sharp, thrilling, jerking pulse in hæmorrhage; the hard, "wiry" pulse in abdominal inflammation; the slow, full, laboured pulse in pressure on the brain; the slow, small, thready pulse in concussion and collapse; the "hammering" pulse in aortic deficiency; the rapid, irritable pulse in hectic; the hard and peculiarly thrilling pulse in disease of the arteries; and the *absence* of pulsation in gangrene, or after the ligature of an artery. In judging of the pulse of an individual, we must be ready to recognize the variations which normally belong to different persons in health—variations so great as to render that which is the "natural pulse" of one an indication of grave disease in another. Such variations refer chiefly to frequency. Sex, too, and occupation, and to a less extent height, produce a certain influence on the fulness, strength, and number of the pulse.

In examining the pulse of any patient, his attention should not, if possible, be directed to the act, and hence a watch should not be ostentatiously held before him. Let the information be got during conversation, after a few minutes have passed, to allow of the first excitement subsiding; and it may be that we even examine some other artery than the radial, so as still further to avoid attention. In the prolabium we can at a glance see the state of the capillary circulation generally; and if in the case of a limb concealed by apparatus, we press the nail of a finger or toe, and observe how long it takes for the color to be restored, we can in like manner determine the state of the capillary circulation in that extremity. Violent pulsation in the carotids or great veins of the neck will attract notice, as indicating cardiac disease or exhaustion, as from loss of blood. Venous congestion, causing lividity or œdema, and a state of preternatural fulness of the superficial veins, either in a limited part or over an extensive region, will command our attention. Finally, it may be requisite to examine the heart by auscultation and percussion, in order to determine its condition.

B. Respiration.—The easy, almost invisible movements of health, are occasionally much changed in disease; and these variations it is important for us to note. We observe—(1), the freedom of the act of respiration, both as regards *in*spiration and *ex*piration, and their relationship to one another. Inspiration is most embarrassed in affections of the glottis, larynx, and trachea; while expiration is most affected in diseases implicating the lungs. (2) The movement of the ribs, whether excessive or diminished. (3) The equality of movement on either side. (4) The speed of the respiratory act. (5) The uniformity of the succeeding respirations (*i.e.* the rhythm). (6) The presence or absence of signs of distress, pain, oppression, choking, &c., and of abnormal sounds accompanying the act, as stertor, crowing, whistling, &c.; the exercise or not of unusual exertion to accomplish the act, as when supplemental muscles are called into play; and the ability or not to breathe in different postures.

The whistling, hissing, stridulous, or crowing inspiration of laryngeal or tracheal affections; the curious sounds occasionally emitted when solid foreign bodies are present in the windpipe; the stifled gasp in wounds of the lungs; the gurgling breathing when blood (or other fluid) exists in the air-passages; the stertor in cerebral compression; the sobbing or sighing respiration in spasmodic and other diseases; the various modifications produced by the pressure of tumours on the air-tubes; the elevated shoulders, dilated nostrils, and loud breathing of those whose respiration is impeded from any cause; the short quick pant of traumatic fever; the catching, rapid gasp in abdominal affections; the fixed ribs and abdominal respiration in lesions of the thoracic walls; the unilateral breathing in effusion into the side of the chest—are all evident and characteristic conditions of the respiration which would strike us.

Modifications of the voice, and the presence, nature, or effects of cough, together with the persistence of hiccup, yawning, and sighing, will all attract attention. In affections of the lips, mouth, throat, and windpipe, we meet with various modifications of the voice and articulation. We use the act of coughing to test the effect of impulse on certain tumours connected with the cavities of the chest or abdomen, and in examining the state of the lungs and ribs. Persistent hiccup in suspected injury of the diaphragm may be important, as, too, in hernia, exhaustion from hæmorrhage, gangrene, &c. "Stethometers" of various forms have been constructed, and are occasionally useful. The "spirometers" of Lewes or Hutchinson will enable the amount of air introduced into the chest, and the power of the respiratory act, to be measured, and so compared at various periods of the case, if such be necessary or desirable.

C. Nervous System.—Very many of the phenomena connected with the nervous system are subjective, and must be accepted with reserve, and interpreted with intelligence. We cannot ourselves test many of the symptoms complained of by the patient, which are referrible to the nervous system; and it is especially in their description of these symptoms that patients are apt to allow imagination to outstrip fact.

We examine the condition of the Intelligence, Sensation, Motion, and Reflex Action.

**Intelligence.**—The mental condition of the patient is one of the first points which will probably attract our attention when examining his state. The degree of mental acuteness; any weakness or perversion of his intellect; the presence of stupor or delirium; and the degree, persistence, intermittence, &c., of the same. The nature, too, of the delirium, if present; its being violent and wild, or quiet and fidgety, constant or remitting. Disturbance of the sensorial functions may depend, it should be remembered, on an affection of the brain itself; or be merely reflex, and depend altogether on disease of other parts. Not only the intellectual faculties, but the moral also, claim our attention. The passions and affections often exercise a most powerful influence on disease; and the practitioner who understands what influence of this kind is at work, will often gain a great advantage. The tastes and inclinations being known, also afford a clue of importance.

**Sensation.**—The increased, diminished, or perverted sensibility of the whole body, or of a part of the body, is always of consequence.

In examining the degree of insensibility of the surface, the contact of a sharp body like a pin may be employed. By inserting it into the skin, the depth of the insensibility can be accurately measured, and with care we can define its limits. The blunt-pointed compasses of Weber or Ogle, or the various other "æsthesiometers" which have been suggested, are most useful in determining the degrees of tactile sensibility in disease; as in this way a commencing anæsthesia, or the presence of hyperæsthesia, can be very accurately judged of. By merely passing the hand over the surface, we can see how far the skin is sensible to contact; and by impinging the fingers firmly on a circumscribed portion, the state of the deeper parts can be examined. Electricity is occasionally of use in testing both the sensibility and the motive power of muscles or limbs. By causing the patient to perform certain movements by which separate muscles or sets of muscles are brought into play, and by communicating movements to the articulations, we are able to define the amount and extent to which the muscular system is affected, and the state of the muscles as to tension, relaxation, &c.

*Pain* is always a material symptom, and often serves as a guide to the disease. "Where do you suffer pain?" is frequently one of the leading and early questions put to a patient; and by the answer received we may be led, not only to the seat, but also to a comprehension, of the whole ailment. Pain may be the only symptom present, and yet be quite characteristic; or it may be but one of a long list of symptoms, though probably the most loudly complained of. Pain is certainly of all symptoms that which in the description given of it by the patient is most apt to be coloured by the "temperament;" as while some will bear even great suffering with stoical fortitude, others will exalt a little suffering into the most excruciating torture. Even by observing the complaint made of the pain by a patient, we obtain a certain amount of information as to his mental courage and bodily irritability—points of no small moment, as bearing on diagnosis, prognosis, and treatment.

(1) *The exact seat and limit* of the pain should be determined, and its possible connection by nervous communication with certain organs or distant parts traced. It may be here remarked that it is always a good precaution to make the patient put his hand on the seat of the pain, as the uneducated

have very peculiar ideas of the position of their various viscera. A knowledge of the distribution of the nerves in the part will frequently lead us at once to the seat of the evil, especially when due consideration is given to the phenomena of reflex action. It is well known how far from the seat of an irritation the pain occasioned by it may be felt; and that the irritation may be found not only in any part of the course of the trunk or branches of the nerve which complains, but in the course of any other nerve associated or connected with it, and that even on the other side of the body. Pain at the periphery, from derangement in the nerve-centres, is as common as irritation of the centres from a peripheral source. In many cases the links of connection are very difficult to trace and unravel; others are more constant, and so more easily recognized. There are certain time-honoured illustrations of what have been very absurdly called "sympathetic pains," or pains complained of at a distance from their source, *e.g.* brow-ache after eating ice; pain in the heel from gastric irritation; pain in the knee in hip-joint disease; pain in the penis and thigh in irritation of the kidney or bladder; pain in the calf of the leg in irritation of the colon; neuralgia of the face in irritation of the abdominal organs; pain in the shoulder in affection of the liver; pain in the back and down the thigh in fissure and ulcer of the anus, &c.

(2) The *nature* of the pain, its *severity and character*, should be determined. Whether it is superficial or deep—fixed or shifting—constant or remitting or intermitting—if intermitting, at what period of the day or night it appears—whether it is acute or dull, sharp, stabbing, fiery, throbbing, heavy, gnawing, boring, darting, twisting, tingling, &c., and whether it is aggravated or diminished by pressure or certain postures.

There is a well-recognized distinction between the severe throbbing pain which attends the formation of pus, and the sharp, stinging, or stabbing, irregularly returning pain of scirrhus—the persistent sharp pain of inflammation, aggravated by pressure and motion; and the paroxysmal, abrupt pain, relieved by pressure, and exciting to certain movements, in colic or spasm—the tingling, superficial pain of erysipelas; and the deep, constant, wearing pain of chronic bone disease—

the gnawing pain of rheumatism—the stabbing pain in inflammation of sero-fibrous tissues—the twisting pain in strangulated hernia—the darting pain in affections of nerves—the acute, rapidly invading, and as suddenly disappearing paroxysmal pain of neuralgia—and the nightly-recurring torment of syphilitic bone affections. These all present to us well-known and characteristic features.

Again, a change in the character of the pain is often instructive, as when after a continuance of a throbbing pulsatile pain in a part, a feeling of dull weight is complained of, by which we surmise that the phlegmon has passed into abscess.

It is often most important to observe at what periods and in what consecution pains recur, as their dependence on certain occupations, actions, or habits, may be thus traced. The exaggerated expression of pain in the hysterical must always be borne in mind, as well as the complaints of those who feign illness. These will be again referred to.

(3) The *absence* of pain from growths is a point which merits attention, as occasionally indicating their character, *e.g.* in the case of tubercular testicle.

Sometimes pain is only excited when the function of the organ or part is called into play, as when the eye is exposed to light, or the ear to sound, or the bladder is made to expel its contents, or when the muscle is exercised. Some structures, like bone and tendon, again, are only painful when diseased, and this fact of itself may help us in recognizing obscure affections.

*Perverted sensibility* throughout the whole body, or in a part, will always claim attention. Excessive heat or cold may be complained of, and yet the thermometer tells of no such variation from the normal state, or, it may be, even indicates the opposite condition—or a sensation of formication, or horripilation, or tingling, or burning, is felt in a part, causing much uneasiness to the patient, and often puzzling the practitioner to explain or set it right.

The condition of the patient's special senses may at times assist us in recognizing his disease. Exalted or diminished acuteness, or perversion of the special senses, may depend on disease in the organ itself, or in the nerve-centres, or on reflex action, the cause having to be sought at a distance, as in the occasional influence on the eye of intestinal worms, and such like.

Further, in this connection the condition of the muscular system should be observed. This depends, however, not merely on the state of the nerve-centres from which the muscles derive their energy, but also on the organic nervous power in the muscles themselves, and also in no small measure on the state of the blood. It is from the state of the blood that weakening, even to a state of paralysis, occasionally attends low adynamic fevers and diphtheria. Muscular movements may be very variously affected, weakened, perverted, or destroyed. Paralysis, complete or incomplete, implicating one or both sides, or portions of the body, is always a serious affair, and should be carefully studied. Hemiplegia, as a rule, points to an affection of the brain; paraplegia to one of the spinal cord. When the sensibility alone is affected, and that to a limited extent, the fault is probably local; when such a condition is combined with loss of motion, and it is at all extensive, the cause may, with most probability, be looked for in the nerve-centres. When the paralysis is limited to one muscle or set of muscles, we can occasionally determine at once the seat and cause of the affection, as when it occurs after a dislocation, in which the displaced bone has pressed for a time against, or has otherwise injured the nerve now at fault. Weakened, destroyed, or irregular action of a muscle, or of a limb, may thus depend on a local affection of the muscle itself, its tendon, its nerve, or its blood-vessels, and these must each, in doubtful cases, be successively examined.

Spasm or twitchings of the muscles of the face, tongue, or pharynx, always call for most careful inquiry, as they are frequently the precursors of grave cerebral disease—apoplexy or palsy. So, too, in children, spasms of the hands or feet are often observed in cerebral irritation, and before general convulsions.

In paraplegia the nerve-centres must be carefully examined, while the extraordinary effect of distant sources of peripheral irritation in producing paralysis by reflex action must be borne in mind in our investigations. Inability to perform certain movements may be due to old injury in bones or joints, and such will not be usually difficult to find. Some defect in the bony levers or processes serving for muscular attachments, or in the relationship of articular surfaces, &c., may cause a failure in the movements of a limb. Twitchings of particular parts of the head or face may indicate grave irritation at the origin or in the course of the distribution of the affected nerve, and so on.

The gait of the patient may at once indicate the degree and kind of muscular deficiency present, and whether it arises from loss of power, or mere stiffness or disease. The staggering, uncertain walk of those suffering from organic disease of the nerve-centres—the general palsy of the insane—the weak movements of the idiot—the unsteady tremulousness of weakness—the violent, ungovernable power of mania and delirium—the jerking spasmodic movements of those affected with chorea—the violent tonic spasms which attend some affections (tetanus, catalepsy, some special affections, and the action of some poisons), and the clonic convulsive throes of others (eclampsia, subsultus, epilepsy, some injuries of the brain, &c.)—the irritable restless movements of delirium tremens, &c., &c., are all most characteristic. The heavy inanimate weight of a paralyzed limb is very expressive.

**Reflex Function.**—It is always important, in cases of paralysis, to know whether reflex acts can be excited, and to observe the degree and extent to which they exist. The " dynamographe" of Mathieu, as shown in the Exhibition of 1862, and delineated in the *Medical Times and Gazette* for that year, may be employed to give exact information, in cases of paralysis and affections of the muscular system.

Finally, it may be here noted, that the condition of the patient's sleep should be inquired into, whether it is quiet and natural, disturbed or restless, &c. When sleep has been wanting, its return is usually a most favourable sign, while the reverse is an equally unfavourable one.

D. DIGESTION.—The powerful and wide-spread influence which derangements of the digestive organs have, on the whole economy, is well known and fully recognized. Many apparently serious disturbances of the circulatory and nervous systems depend wholly on such derangements, and symptoms of the most anomalous and obscure nature will frequently disappear, so soon as the digestive organs are restored to order. The ready sympathy which exists between the brain and the gastro-intestinal tract is well known, and not only in affections of the former, but also in very many other surgical ailments, attention to the gastric functions becomes a matter of the first moment.

The patient's desire for food and drink should always be known to the surgeon. The excessive voracity of bulimia, and in a lesser degree in diabetes—the unsatiable hunger in false anus, placed high in the intestinal tract—the absence of all appetite in fevers and other debilitating complaints—the unnatural craving in tubercular disease of the mesentery, in some forms of dyspepsia, and when intestinal worms exist—the depraved tastes seen occasionally in the chlorotic and hysterical—the pain which attends the ingestion of food in gastric ulcer, and in various forms of dyspepsia—are common examples of deviation from the usual conditions which attend the desire for and the ingestion of food.

As to thirst, it is excessive in febrile states of the system, in diuresis, and especially in diabetes, in intestinal fluxes, &c., c. It is altogether absent in other complaints, and depraved in some few.

The tongue is a ready, and generally sure index, of the state of the digestion, and also, in a great measure, of the condition of the whole system. While, certainly, we would look in vain to the tongue alone for all the elaborate and minute indications which Dr. Ridge would lead us to believe were there to be found, as to the state of the brain, lungs, pleuræ, stomach, liver, greater and lesser gut, &c., yet that the condition of the digestive organs, the presence of mental emotion, and the amount of constitutional irritation present, can be *usually* well recognized by an inspection of the tongue, is well known. Individual peculiarities affect, in no small degree, the appearances of the tongue, and, as in irritable and sensitive patients, its condition may be very considerably changed by the fatigue and anxiety of an examination of the different organs, it is a good plan to inspect it at an early, rather than at a late, period of our proceedings. The state of moisture, colour, size, smoothness, coating, integrity, &c., should be noted, together with the condition of the papillæ on its surface, its tremulousness, the mode of its protrusion and withdrawal—whether it is swelled, indented with the teeth, glazed, raw, hacked, ulcerated—having aphthæ or mucous tubercles on its surface ; and if furred, the colour and distribution of the covering.

In our inspection of the mouth and throat, we observe if there are ulcers, and if so, whether they be simple, malignant, syphilitic, &c.—whether there is a line on the gums, such as is caused by lead or phthisis—whether there is sordes on the teeth, as in low exhausting ailments—whether the gums are swelled and tender, as in mercurial action; or spongy, as in scurvy. The state of the teeth also, as indicative of struma, hereditary syphilis, &c., will be noticed, and also the abundance and character of the saliva. Ulceration, or false membranes on the tonsils, or throat, swelling, œdema, &c., will all attract attention. The microscopic examination of the sputum is seldom called for in surgical practice, but is, I believe, capable of affording most valuable aid in the early recognition of lung disease.

The act of swallowing may be difficult, or impossible, from local causes, as ulceration, inflammatory swelling, &c., or from more obscure and less appreciable causes, as tumours within or without the pharynx or œsophagus, stricture of these tubes, functional or organic derangement of the brain or the nervous system, the presence of foreign bodies, &c., &c.

A constant attempt to swallow may be due to an elongation of the uvula, or some other irritation of the pharynx, as the impaction of a foreign body. There may be a return, too, of the food and drink by the nostrils, in inflammation, and especially in ulceration of the pharynx or epiglottis. The regurgitation into the mouth of the semi-digested food is a common symptom in organic stricture of the œsophagus, particularly when attended by dilatation of the canal above the seat of contraction. Retching and vomiting, if at all persistent, cannot be overlooked, and the character of the ejected matter should be known. In head affections (whether injuries or apoplexy) retching and vomiting are frequently the earliest symptoms of evil. In strangulated hernia, and other intestinal obstructions, the occurrence of stercoracial vomiting is most instructive. In irritation of the kidney and inflammation of the bowels; at the outset of purulent infection, and gangrene, retching is a frequent symptom. In affections of the stomach the nature of the vomited matter is often characteristic, as in sarcinæ, malignant disease, pyrosis, &c.

The act of digestion has, in many cases, to be minutely inquired into, and the regularity and character of the alvine evacuations to be learned. The deficient, irregular, or excessive action of the bowels very materially influences the progress of surgical, as it does nearly all other ailments. The stools may vary much in character, from the serous purging of some complaints, to the hard scybalous dejections of others. The colour, too, varying, not merely with the absence or superabundance of some of the usual excretions, but also with the food and the medicines taken, will, in many cases, give us important aid in our investigations of an obscure disease, and the mixture of blood, or pus, or fat, or shreds of tissue, or worms, or undigested food, is always significant.

If there be blood mixed with the fæces, its source may be surmised from its mode of mixture. When it comes from a high part of the intestinal tract, it is so incorporated with the feculent matter, as usually to render it black and tarry, while, when its source is low down, it is streaked over the fæces. In some cases it precedes, in others it follows, the evacuation.

The *shape* assumed by the fæces may be characteristic of certain ailments. Thus it may be compressed into a ribbon-like shape, twisted like a screw, flattened or grooved on one side, &c. In this way constrictions of the bowel, posterior enlargement of the prostate, backward displacement of the uterus, the presence of a tumour, &c., may show themselves.

Defecation may be difficult or painful, and that would signify to us some contraction or other affection of the rectum or anus; involuntary evacuations again would imply general nervous prostration or some local weakness.

E. GENITO-URINARY ORGANS.—The healthy or morbid condition of the generative organs in both sexes, is most important to examine, from the wide-spread influence they have on the whole economy.

In the *male*, we observe whether the scrotum is in a healthy state of contraction, or morbidly relaxed; whether the testes are firm, and of normal size, or soft, or enlarged, or wasted. From such observations we gain frequently much information, not only as to local conditions, but also as to the state of the general system. The retraction of one or both testicles—the absence or inordinate presence of venereal desire —the existence of venereal desire, without the power of fulfilment, when the nerve-centres are sound, but the organs at fault, &c.—Priapism depending on spinal disease, or some local irritation in the bladder, kidney, or rectum—incomplete erections, followed by discharge of semen, depending on general debility, or local irritation in the bladder or rectum. The excessive loss of semen is most exhausting, and indicative of lowered vital energy.

In the *female* the condition of the catamenial function has a most powerful influence on the development and progress of any affection she may suffer from. The suppression, deficiency, or inordinate excess of the menstrual discharge, gravely affects her economy. The existence, too, of leucorrhœa should be known. The venereal desire in the female, being mainly dependent on the state of the uterus and ovaries, may, in some few cases, require to be investigated. Any irritation in the external or internal generative organs stimulates that desire; while disease in these organs, or in the general system, or in the nervous centres, may destroy it.

Very important information is frequently obtained from an examination of the urine, not only as regards the condition of the urinary organs themselves, but also with reference to the whole economy. The kidneys being one of the chief outlets from the system for effete and foreign materials, we are able, by a chemical and microscopic examination of the urine, to detect and estimate the nature and amount of these excretions, and thus to obtain data of the utmost moment for judging of the disease affecting related organs, or even distant parts of the body. The specific gravity and chemical characters of the urine should in all doubtful cases of disease be carefully inquired into. Both the quantity and the quality of the secretion should be noted. The scanty, high-colored urine of the febrile state contrasts strongly with the abundant limpid discharge in hysteria. In diabetes the quantity passed is sometimes enormous; while in some chronic affections of the kidneys it is occasionally incredibly small. I have known a case in which the average amount passed in the twenty-four hours has never exceeded two ounces for years.

The mixture of blood, or bile, or pus, or sugar, or albumen, or mucus, or sand, or shreds of tissue, or tubular casts with the urine should be carefully observed, as such admixture is always important and frequently reveals to us at once the nature of the ailment present. The existence of certain salts, or the absence of others, may explain symptoms in distant parts otherwise inexplicable. For example, when the vessel is seen studded with red gravel, and the patient suffers from violent pain in the groin, thigh, and leg—when a red blotch or stain occurs in the bottom of the utensil, and the patient suffers from symptoms of deranged liver—when we see the deep brown of jaundice, the stinking ropy urine of diseased bladder, &c., &c.—we have little difficulty in understanding the symptoms present. The colour which the urine may obtain from various articles of diet should always be borne in mind.

The significance of blood being mixed with the urine will be considered under the head "Hematuria;" a few remarks, however, fall to be made here on the meaning to be attached to the presence of pus. Urine containing any quantity of pus is of a milky opaque appearance from the moment it is passed, and after a time the pus falls to the bottom, where it forms a creamy stratum, either alone, or, as is more usual, mixed with other deposits. The supernatant liquor generally retains some degree of milkiness, and becomes, after a time, alkaline. It is coagulated by heat in proportion to the amount of pus it contains—some acid being first added if the urine has previously become alkaline. The addition of liquor potassæ renders the purulent deposit much more viscid, ropy, and glairy, and it is not dissolved by dilute acids. Under the microscope, the nature of the deposit is at once apparent.

The pus may come from any part of the urinary tract—it may be due to gonorrhœa, gleet, or stricture of the urethra, inflammation or abscess of the prostate gland, inflammation of bladder from the irritation of a foreign body, catarrh or gout, or arise from inflammation of the ureter or kidney. The source of the pus is, in any case, determined by the symptoms which have preceded or accompanied its appearance. Gonorrhœa, gleet, and stricture are easily recognized, either by ocular examination or the use of a bougie; inflammation or abscess ot the prostate makes itself known by well-understood signs, dwelt on elsewhere; while the pain which, in such a case, accompanies the act of micturition is continuous, is not relieved by the act, and is referred to the neck of the bladder. The pus, too, does not mix intimately with the urine excreted.

Foreign bodies in the bladder are detected by instrumental examination, and the symptoms they occasion are usually very distinctive. The pain of micturition, in such cases, *follows* the act, and disappears as the bladder fills. In cystitis the pus is mixed with much ropy mucus and crystals of triple phosphate.

Irritation and inflammation of the ureter is generally associated with an affection of the kidney, and the symptoms of both are combined. The ureter itself, from its limited surface, is unable to supply any great amount of pus to the urine. Pyelitis, or suppurative inflammation of the substance of the kidney, is recognized by the antecedent and accompanying indications of that very formidable affection; by the pain increased by pressure over the affected kidney; by the violent pain which *precedes* micturition, commencing in the kidney, and descending into the bladder and perineum, and perhaps passing to the glans, and which is relieved by the evacuation of the urine—an evacuation which is frequently sought in order to obtain this relief. In such a case, the pus, after a time, forms a distinct layer in the bottom of the vessel, while the milky, supernatant liquor is charged with albumen. Shreds of fibrine and blood discs will be mixed with the pus.

The presence of a calculus in the kidney is usually easily recognized, especially when it begins to move downwards into the bladder. The pain in the loins and down the ureter, the hematuria, the sickness and retching, the occasional retraction of the testicle, all proclaim the affection.

It must always be remembered that a lumbar abscess may burst into the ureter; or an abscess in the neighbourhood of the urinary passages, finding its way into some portion of these passages, may be the source of the pus; and also that in the female, leucorrhœa or inflammation of some part of the vagina may be the cause of the purulent admixture.

Further, in connection with the examination of the urinary organs, it is requisite that we should learn whether the act of micturition is performed freely or with difficulty, and whether it is accompanied by pain—whether at the usual intervals or not—whether it occurs involuntarily or with the power of resisting the desire and commanding the act. A careful distinction must be drawn between retention and suppression. The latter state, besides its importance as regards the condition of the kidneys, is of much significance in obstruction of the bowel, as indicating the situation of such obstruction. In any case the error observed may not be due to anything in the urinary apparatus, but have to be sought for in the nerve-centres or in the general system.

In his investigations of disease, the surgeon has frequently to supplement his senses by the use of instruments. The use of the stethoscope and pleximeter has been already referred to. The magnifying lens and microscope are now in daily use to examine tissues and secretions, discharges, growths, degenerations, and deposits, &c. The real value of the microscope as a clinical assistant is being daily appreciated, while unreasonable and unwarrantable expectations as to what it could achieve are being corrected. This instrument calls for no description here. The aid sought from it will frequently be alluded to afterwards.

Most ingenious contrivances have now been suggested for the exploration of the various cavities and passages of the body. *Specula* for the eye, mouth, throat, nose, ears, anus, vagina, and urethra have been made of many forms. The *ophthalmoscope* enables the very depths of the eye to be explored, and even the condition of the circulation in the brain to be defined; the *laryngoscope* has opened up a most interesting field for investigation, and promises to clear up much that was obscure and difficult of recognition in affections of the windpipe. Sounds, bougies, catheters, probes, exploring and acupuncture needles, too, are used by the surgeon in his examinations.

*Mouth and Throat.*—Tongue depressors and specula of various kinds are employed to facilitate the inspection of the fauces and cavity of the mouth. By some of these (like Chassaignac's or Weiss' "speculum oris") the jaws are kept apart while the tongue is depressed; by others (like Ricord's) a lamp and reflector are added; or like Charriere's three-valved instrument, which is expanded within the mouth, the whole interior is exposed, while the tongue is at the same time depressed. The handle of a spoon, a paper-cutter, or a spatula may, in most cases, well take the place of the regular tongue depressor. Retractors of bright metal, which hook the cheek back and illuminate the mouth, are also constructed, and in the examination of affections of the jaw are highly useful. Two wire hooks, one having blunt prongs for insertion between the teeth, attached to either end of an elastic band for passing behind the head, is also good for holding the cheek back, and at the same time separating the jaws.

Laryngoscopes have been constructed of several patterns, the tendency being always to simplification. The instrument used by my friend Professor Czermak, in which the mirror is attached to the observer's forehead, has always appeared to me the most useful.

Not only may the larynx throughout its length, but the trachea also, in a great measure, can be inspected by means of this instrument, so soon as the observer and his patient have become accustomed to its employment. In chronic disease it is invaluable, and in some cases of acute disease it may be employed; but as a rule it cannot be successfully used when the pharynx and upper part of the larynx are in an irritable condition. For the investigation of morbid growths, affections of the vocal chords, and ulcerations of the larynx, and also for the examination of the posterior nares, it is invaluable, not only for the *positive*, but frequently for the *negative*, evidence it affords us in investigating obscure cases.

Lewin, of Berlin, has introduced an "œsophagoscope," which consists of a mirror and a dilator, and, in cases of morbid affections of the lower part of the pharynx and upper portion of the œsophagus, promises to be of great service.

*The Eye.*—Retractors for the eyelids enable us to examine and operate on these parts, or on the eye itself, with facility. The ophthalmoscope is one of the most remarkable and useful inventions of our day, and allows us to examine with precision the depths of the eye, and even, as was before said, to judge of the state of the circulation in the brain beyond, by observing the state of the blood-vessels in the deeper portions of the eye. When this instrument—every day being more simplified, and consequently more employed—comes into general use, not only will the diagnosis of obscure eye affections be rendered much more certain, but the treatment of eye diseases generally will be rendered more sure and satisfactory.

*The Ear.*—The examination of the external ear is much facilitated by the use of a speculum. The ordinary trumpet double-convex speculum of Toynbee; or the less expanded and round metallic tubes of Wilde or Avery; or the three-bladed expanding instrument of Weiss; or bivalve of Charriere; or the speculum of Hervey, which dilates by means of lever handles; or those instruments which conjoin a reflector and lamp, like Avery's oil lamp or Miller's candle; or the powerful "auriscope" of Dr. Brunton, which contains angular reflectors of considerable magnifying power, and uses sunlight; and others (Kramer's, Bozzini', Trequet', &c.), which it is needless to mention, fulfil this end in various ways. It may, however, be remarked, that as a general rule expanding instruments are of little use, and that a simple reflecting tube usually fulfils all requirements. By fastening a small piece of wax candle in front of a large bright metal spoon, a very convenient and easily obtained "speculum auris" may be improvised. When employing the smaller instruments, the patient's mouth should be kept open, in order to relax the parts, while the auricle is gently drawn backwards and outwards, and the tragus pushed forwards. so as to render the passage straight, and so facilitate the introduction and use of the instrument. "Otoscopes," like that of Toynbee and others, have been invented to enable the surgeon to judge of the state of the inner ear and Eustachian tube. They consist of a tube, one end of which is inserted into the patient's ear, and the other end into the surgeon's. Movements of air or fluid, and various musical sounds within the middle ear, excited by swallowing or forcing air through the Eustachian tube, can be heard; and the sounds thereby produced frequently convey information of much use.

*Nose.*—The cavity of the nostrils can be very effectively examined by means of several of the ear specula already alluded to, although special instruments are made for such inspections. A two-valved instrument flattened laterally answers well; and Metz' "speculum nasi," consisting of two separate limbs held in either hand, and used as dilators and reflectors, is most useful for such examinations. By pushing up the point of the nose, however, and hooking out the ala by a bent probe, the interior of the nostril can be well seen. By means of the laryngoscope the posterior nares can also be most perfectly inspected.

*The Vagina.*—For the examination of this passage, or to facilitate operations upon its walls, a very large variety of specula have been suggested since Franco invented his clumsy screwing instrument. Simple tubes of bright metal or silvered glass, covered or not with vulcanite, are often sufficient for our purpose; but they are not so easy of introduction as valvular instruments; and being closed at the sides, do not fulfil all purposes. It is chiefly for the examination of the "os" that they are employed. Vaginal specula are made of two, three, four, and even more blades. The two and three bladed are in common use. An oval, round, or square field can be obtained by different instruments; and by means of Bozeman's duckbill retractors, and Hilliard's speculum for vesico-vaginal operations, much space may be got. In any case sun-light is preferable for such examinations to artificial illumination; but by means of lamps and reflectors some instruments supply additional light when wanted. The many patterns of vaginal instruments suggested by Jobert, Ricord, Charriere, H. Bennet, Coxeter, Fabri, Madam Boivin, Segalas, &c., are known to most surgeons. Nelson's instrument has the advantage of having movable handles and flat blades, which can be detached; while in Charriere's new model the handles fold back so as to increase its portability. Fabri's four-valved allows of each blade being turned back for cleansing, or being removed and used as a spatula. The walls of the canal can be inspected by means of Weiss's three-bladed dilator and speculum passed between the blades; or by Beaumont's five steel-bladed speculum; or Churchill's, with fenestrum running the whole length of the tube; or Protheroe Smith's, having a shorter oval fenestrum. Specula of ivory and porcelain are occasionally used, when caustic is to be applied, and wire-hooped instruments have been employed by some. To fulfil its end properly, a speculum should give a good view of the parts to be examined; should be light, portable, easy to clean, and easily introduced and expanded. Intra-uterine specula ("uteroscope"), as those of Jobert, Moulin, Langier, and others, are in exceptional cases useful.

The axis of the vagina varies very considerably in different patients; and the size of the orifice differs so widely that care must be taken both in selecting and introducing a speculum. The extremity should at first be inclined towards the anus, and pressure made on the lower wall, when it is passed beyond the sphincter, before it is pushed onwards. The speculum should be heated and well covered with glycerine. In passing the instrument upwards, we gently rotate it on its axis; and if resistance is met with, it should be withdrawn before being forced onwards, the axis of the canal being always remembered.

*Anus.*—A short glass reflecting speculum, with an oblique opening at the point (Ferguson's), is a very good form of instrument in many cases; or the metallic speculum, with closed end and open side, having a wooden plug inserted into it while the instrument is being passed, and a handle which can be fixed by means of a screw, at various angles, is also most useful. The expanding instrument (in two or three valves) of Charriere; or Lane's three-bladed speculum, the handles of which are placed almost in a line with the blades; or Weiss's two-bladed speculum and dilator; or Ashton's three-bladed speculum—are employed by some surgeons in preference to others. All edges which come into contact with the bowel should be well rounded ; and as a rule it is best to have the handle fixed at right angles to the blades, so as to prevent the view being interrupted.

When using a speculum in any cavity, it should be introduced with gentleness and care. The patient should be placed in the most favourable position both as regards himself and the surgeon—*i.e.* one which necessitates the least amount of fatigue, secures a good light, and facilitates introduction, and the subsequent examination.

*Urethroscopes* have been frequently attempted. Desormeaux of the Necker employs a tube containing a metallic mirror, with a hole in its centre, and placed at an angle of forty-five degrees with the axis of the instrument. It can be attached to catheters which are open at the side for the application of any medication. A diaphragm pierced at the centre is attached to the end opposite to the catheter. A gas-lamp with a reflector is placed in a second tube, which stands at right angles to the first, and the light is thrown on the mirror, and hence on a stricture or any point to be examined in a deep passage. Leiter of Vienna showed at the Exhibition of 1862 a very simple urethroscope, consisting of three probe-pointed steel rods, which separate and stretch a bell-shaped piece of vulcanite, constructed so as to throw light into the canal. At best, however, these contrivances have proved of little use.

*Probes and Sounds* are usually made of metal (steel or silver), and are employed to explore cavities. Silver probes are tough, little liable to corrode, and admit of being bent so as to fulfil various ends. Steel, however, is better (as being more dense) for some purposes, as detecting necrosed bone. If made with a fine point and a broad handle (the better to communicate the sensation of contact), it is a very sensitive aid to the hand in such examinations. For special ends, probes may be made of other material, as Nelaton's porcelain probe for the detection of leaden balls in the tissues, or Favre's electric probe for the same purpose.

The probe serves the surgeon as an elongated finger to reach parts otherwise inaccessible. The direction, extent, and often the nature of narrow passages are thus discovered; the position and nature of foreign bodies determined; the state of bone decided; and many other points judged of which daily demand investigation. The probe should be used with the utmost gentleness. In fact, in its mode of employment we may in a great measure judge of the skill of the surgeon. Between the light contact, the "educated touch" of the master, and the coarse dangerous manipulation of the mere mechanic, the patient and bystanders at once perceive the contrast. More information can generally be got by the light touch of a probe, than from its more common (alas!) mode of employment, and the difference to the patient is enormous. False passages are frequently *made* by its clumsy use, and the repeated introduction of the instrument, merely to satisfy curiosity, or to "do something," cannot be too strongly reprobated.

Probes are from 4 to 12 inches long, and should have well blunted round points, and an eye at their other end by which a ligature or seton may in an emergency be passed.

The finger is the best probe when it can be employed, as it is little apt to injure the soft parts. Less harm is done by such a soft, sensitive instrument, and more information is obtained, than by any metallic one. In any case the parts should be relaxed as much as possible before exploring. When examining wounds having foreign bodies imbedded in them, the parts should be carefully placed in a position similar to that they occupied when the foreign body was forced in; and the surgeon when exploring should stand in the same relative position to his patient as did the person who inflicted the wound. This is a rule as old as Hippocrates.

If wounds of the thorax and abdomen are explored at all, the finger alone should, as a rule, be used. A probe in such a case is better avoided.

The *Sound* is just a long probe with a greater or less curve near its extremity, and is employed for examining cavities. It may be solid or hollow, and for some uses is graduated (uterus). A hollow instrument enables fluid to be introduced or withdrawn, and so the examination sometimes facilitated. It is in examining the urethra and bladder that the sound is chiefly employed by the surgeon. It may be made of steel or silver, and the curve varies according to circumstances. A short abrupt curve, or one having a rectangular portion, is best for examining the bladder for foreign bodies. It should be highly polished, and the end well rounded, and perhaps slightly bulbous. The condition of the urethra, prostate, and bladder, can be thus examined, and the size, number, shape, free condition, hardness, and position of a foreign body lying within the bladder determined. A lithotrite can, in the case of calculi, be advantageously substituted for the ordinary sound, as by it the size and number of the stones can be very accurately judged of. The additions made by Moreau and Leroy to the ordinary sound, and described when speaking of examining the bladder for calculus, intensify the effect of contact between the sound and a foreign body. By means of the stethoscope applied to the pubes or sacrum, too, the same result is in some measure attained.

*Bougies* are employed to determine the diameter and direction of canals, and also to dilate passages. They are thus used in the gullet, rectum, urethra, and in some cases in the larynx. They are formed of metal, or of elastic tissue, gum, gutta-percha, india-rubber material, gentian-root, sea-tangle, cat-gut, wax, &c. Strictly speaking, the term "bougie" should be restricted to instruments of wax.

Metallic instruments are much more easily guided through narrow and intricate passages than those formed of softer material, and in qualified hands are not more liable to lacerate or form false passages—an accident fairly chargeable to the operator and not to the instrument. When we desire to obtain the shape of any passage or obstruction, then a wax bougie, which, to a limited extent, will retain an impress, may be of use. Gutta-percha bougies are exceedingly objectionable, from their liability to break. Bougies of woven tissue, having rat-tailed points, are very good to enable us to pass through very small and tortuous strictures. In some cases conical or sharp-pointed instruments may have advantages; but, generally speaking, sharp-pointed bougies are objectionable, from their liability to get entangled and to make false passages. If there is no obstacle within the urethra (for which bougies are most frequently employed), the meatus may be taken as the gauge of the instrument to be passed, and as large a bougie used as will fill the canal. The instrument should be gently heated and well lubricated before being passed. Cocoa-nut butter, glycerine, or watchmaker's oil are better for this purpose than olive-oil, which is too thin.

By means of the bougie we gain information as to the size and direction of passages—the position, nature, and degree of resistance, and extent of obstructions or constrictions in such passages—the presence of spasm, the effects of contact, and many other important points. To dilate canals, to remove morbid sensitiveness from their lining membrane, to reduce spasm, are among the most common uses of the bougie. "Armed bougies" are instruments having caustic attached to their extremity, and are employed to act directly on strictures. "Medicated bougies," again, are instruments smeared with various medicinal agents, whose contact with the walls of the passage is desirable.

"*Catheter*" is used in this country to signify a hollow sound employed to introduce or remove fluid or air from cavities. This is by no means the restriction of the term in ancient surgical works, nor yet in the continental writers of our own day. These instruments may be made of metal or elastic material.

The *exploring needle* is now-a-days fortunately much less used than it formerly was, and the harm its indiscriminate employment is capable of doing is now better understood. The need for its use has diminished with the other improved means of diagnosis at our command.

When it is necessary to form a decision as to the nature of a tumour, and after all our other means of discrimination have been exhausted, then, and then only, the exploring needle comes in as a legitimate resource, "pour avoir le dernier mot."

A fine sharp smooth grooved needle is the most commonly employed, and the most useful explorer; but a very fine trochar and canula is preferred by some. Coxeter's "suction trochar" removes a larger quantity of fluid for examination. A narrow knife passed into the tumour and then turned on its side, is a ready and tolerably efficient way of obtaining some of the fluid contents of a tumour, especially if such contents turn out to be of a nature which we wish to give exit to, as the incision may at once be enlarged.

An exploring trochar, if small, is apt to get closed by thick pus, fat, cellular tissue, &c.; and if, as occasionally occurs, the sac has been transfixed, it will only be as we slowly withdraw the instrument that any fluid will flow. This cannot occur with the grooved needle.

When, after introduction, the point of the needle moves freely, we may conclude that we have entered a cavity, or the substance of a tumour, which is composed of very soft and easily broken down material.

Blood-vessels and nerves should be very carefully avoided in using any of the exploring instruments; and if it be thought desirable, the needle may be carried some way sub-cutaneously before the tumour is entered.

In all cases such means of exploration should be most sparingly employed, and that only when our other sources of information have been exhausted. Much irritation and accelerated growth may be directly due to the passage of even a fine exploring needle into a tumour.

*The acupuncture needle* is occasionally useful as a means of diagnosis, *e.g.* in cases of dislocation, accompanied by great swelling, where it is difficult to recognize the position of processes of bone, and thus the nature of the accident is masked. The position of these processes may in many cases be satisfactorily determined by the use of the needle. Balls, too, and other foreign bodies imbedded in the tissues, may occasionally be distinguished by the same means.

Chemical agents are in frequent use in our investigations of disease at the bedside. "Test" papers are employed for the secretions, and "reagents" of various kinds are of daily utility. De Luna, of Madrid, sent to the last Exhibition a most useful case of reagents, in a dry state, for the examination of the secretions at the bedside, to which he gave the name of "bolsa chemica." How important may not the discovery of phosphate of lime in the pus from a deep abscess be, or the existence of urea, or bile, or chyle, in the discharge from a fistula, as indicating the source from which they proceed!

By chemistry and the microscope combined, we determine the character of many tumours, solid and fluid, urinary deposits (which depend on so many different conditions of the system), some cutaneous eruptions, &c. &c.

Finally, the effects produced by remedies are occasionally instructive in a diagnostic point of view. In modern times the influence of treatment is not tried so frequently, nor relied on so much, as a means of diagnosis, as in the days of our forefathers, yet the effects of mercury, hydriodate of potash, quinine, iron, muriate of ammonia, &c., enable us occasionally to recognize the latent cause of an affection, as do the influence of Spas and baths. In some cases the use of certain mineral waters, either internally or externally, causes the equivocal symptoms present to become so developed that no longer doubt can be entertained as to their nature. It is especially when the disease is one which is due to specific causes, and which is capable of being influenced by specific remedies, that such tests of its nature are applicable. In such instances the remedy is occasionally a very touchstone, which reveals at once the nature of the complaint. Even in accidents of doubtful nature, the application of remedial measures may be used to elucidate the diagnosis, as when we apply extension and counter-extension in a case where we are in doubt whether it be dislocation or fracture.

# OUTLINES

# OF

# SURGICAL DIAGNOSIS.

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**ABSCESS** (*abscedere*, to separate).—A circumscribed collection of pus as (contradistinguished from purulent infiltrations).

Divided into (1) "Acute," "phlegmonous," "hot," and (2) "Chronic" or "cold," according to the presence or not of acute inflammatory action. Chronic abscesses are termed "symptomatic" and "idiopathic," or "by congestion," in certain cases. The first appellation is used when they are connected with diseased bone.

(1) Acute abscess usually occurs in parts where there is a large supply of cellular tissue, and its formation is preceded by signs of acute inflammation, *i.e.* heat, pain, redness, and swelling in the part; these, by degrees, concentrate themselves in the spot where the pus forms. Pain is probably the most constant and characteristic of these signs. When the abscess is small and deep (as in the finger), this pain may be the only indication of matter we have. At first the pain is pulsatile and notably aggravated by pressure and by a dependent position, and afterwards it assumes a dull heavy character when the matter is fully formed.

*When the abscess is superficial* a tumour will present itself which is soft and elastic at its centre, and hard at its circumference. As the hard engorged phlegmon, which is in the first instance present, gets converted into pus, the softness is first observed at the centre, and extends outwards. The feeling of softness, due to the formation of fluid, becomes increased till *fluctuation* (the most characteristic of all the signs of fully formed abscess) is established (see p. 24).

The subsequent "pointing" or conical projection of the pus on the surface; the change in the color of the most prominent part of the skin from red to yellow, as the matter comes to shine through; the œdematous swelling of the parts around the abscess; and the occasional appearance of sudamina over it, when it has existed for some time—these, together with general fever, if the purulent collection is large, and the occurrence of irregular chills, horripilations, or even rigors, followed by heats, are distinctive and diagnostic of the formation of abscess.

Thus, then, phlegmon, accompanied by pain, first of a pulsatile then of a heavy character, and attended by chills—the swelling becoming fluctuant and being marked by œdematous surroundings—will indicate the formation of abscess.

The rigors generally (but by no means always) mark the actual formation of the pus, and they may (especially when the abscess is deep) recur for days at such regular intervals as to be mistaken for attacks of ague. When the local inflammation has ended in suppuration the constitutional fever usually diminishes or disappears, and the pain, heat, and tension diminish, while the swelling commonly augments.

To recognise a *deep abscess* is occasionally very difficult, and, as was said by S. Cooper, is one of the best tests of a surgeon's tactile ability. Sometimes such recognition is impossible.

When an abscess is placed below an aponeurosis, and especially if it be beneath a bone, many of those characters which we look on as distinctive may be wanting. In many cases we may have an ill-defined general swelling, accompanied by hardness, tension, and pain (proportioned, for the most part, to the tension), and perhaps some elevation of temperature; but if the abscess is small, several of these characters may be absent. Fluctuation, if present, will in general be very obscure, but the violent and pulsatile pain, and the occurrence of œdema in the overlying parts together with rigors or chills, will show what has taken place. In some cases, *when it is absolutely necessary* to decide the question, the grooved needle may be inserted. Dupuytren's plan of incising the overlying parts, so as to allow of the tumour being more closely palpated, or to permit of the pus pointing in the wound, has been justly abandoned as useless and puerile. In the perineum (where it is so desirable to recognize and evacuate the matter early) the formation of deep abscess is determined by the occurrence of difficulty and pain in micturition, and the appearance of prominence in the perineum, together with the discovery of fluctuation when pressure is made alternately by a finger introduced into the rectum and one placed outside. The pain too is greatly augmented by such pressure.

An acute abscess has been confounded with

(*a*) Local œdema of the cellular tissue in the neighbourhood of joints, or on the dorsum of the foot or hand, when that condition is accompanied by pain and redness. If there is effusion into the articulation at the same time, this mistake is the more apt to occur. The distinction is made by attention to the history of the case, and to the characters of an abscess, as described above.

(*b*) Aneurism.—This can only occur when a purulent collection is placed over a large artery, as in the axilla or popliteal space. In such a case the abscess receives a pulsation from the vessel below. The history and progress of the case; the want of a defined outline in the abscess; the effects of pressure in diminishing it; the redness of the surface; the fluctuation; and a careful attention of what is said at p. 28 on the characters of "pulsation," in either case will differentiate them.

(2) *Cold or Chronic Abscess* occurs generally in young persons, of lymphatic or scrofulous temperament. It is very slow in its progress, and often very undefined in its characters. It begins as an engorgement of the part, which softens into an elastic, indolent, slowly increasing, circumscribed, fluctuating tumour, which is sometimes of great size. The stage of engorgement occasionally attracts no notice. When the abscess is formed it does not acuminate—"point," as an acute abscess does—the temperature of the part is not elevated, and the

skin over the swelling remains for a long time unchanged, and is not bound down to the underlying parts. If it is going to burst, the dull redness of the integuments at the threatening point will declare what is about to occur. From the thinness of the overlying parts, the absence of œdema, and the liquid nature of the contents, fluctuation is usually very marked in these cases.

The effect of the pressure of an abscess, in some cases, is such as to cause pains, which have been mistaken for rheumatism.

Thus, then, the engorgement of the part—the slow indolent progress—the distinct fluctuation, and the skin remaining long unchanged—are the most distinctive indications of chronic cold abscess.

When the abscess is "symptomatic," there will be antecedently, or contemporaneously, indications of some bone affection in the neighbourhood, or at a point from which the pus could travel to the place where we find it (as in the migrations of pus in connection with disease of the spine). The tumour, too, will appear without any pre-existing engorgement of the part where it is found, and in many cases pressure will diminish its bulk, by forcing back a portion of its contents along the passage by which it has come.

Thus, the position of the purulent collection—the pre-existence or co-existence of bone affection—and the influence of pressure on the tumour—are the most distinguishing characters of a symptomatic abscess.

Cold abscess has been confounded with

(*a*) Lipoma, from the characters of true and false fluctuation (p. 24) not being carefully studied.

(*b*) Cysts and hydatid tumours presenting themselves at those parts where cold abscesses are most apt to appear. The history of the case, the age and appearance of the patient, and, if necessary, the results of exploratory puncture, will distinguish them. Generally an observance of the site of the tumour prevents a mistake being made.

(*c*) Hernia (see it).

(*d*) Soft cancer (see it, and also p. 24 on fluctuation, already referred to).

The history of the cases—the pain in the one and not in the other—the implication of the skin—and its change of colour in the cancer—are distinctive.

(*e*) Aneurism has been frequently confounded with cold abscess, where the pus lay over a great blood-vessel. (See p. 28, as to pulsation.) The progress of the cases, too; the fluctuation and effects of pressure, and attention (when possible) to the fact, that while an abscess softens from the centre outwards, an aneurism hardens from the circumference inwards, as the contained clots become consolidated, will distinguish them. As to the effects of pressure in diminishing an aneurism, and not an abscess, it may be remarked that in some situations, as the axilla, neck, and even in the groin, pressure may cause a small chronic abscess to disappear beneath the surrounding parts, and so to seem as if it were reduced; but when the pressure is removed it returns *at once*, and without that lively elastic feeling an aneurism communicates under like circumstances to the hand.

(*f*) In some situations secretions, accumulated within ducts, or protrusions of hollow viscera, containing fluid, have been confounded with cold abscess. So it has occurred with ranula, hernia of the urinary and gall bladders, hernia of a distended ureter (Petit and Boyer), &c., but these latter affections are very rare.

*See also* PELVIC ABSCESS.

**ACROMION**, FRACTURE OF. *See article* FRACTURE.

**ADENITIS** (ἀδὴν, a gland). Inflammation of a gland. This may be acute or chronic, simple or specific, idiopathic or symptomatic.

Idiopathic adenitis may be due to injury or irritation of a gland, or to inflammation propagated to it along its efferent vessels. Blows, strains, and cold are among the most common causes of idiopathic adenitis.

Symptomatic adenitis arises from the action of specific poisons on the gland, as syphilis, cancer, plague, malignant pustule, the poison of dissection wounds, &c. Adenitis is most common in young lymphatic persons of scrofulous habit. It occurs most frequently in the neck, axilla, and groin.

*Acute Adenitis* presents itself as a hard, painful, circumscribed, well-defined, globular or oval swelling, in some of the regions where glands exist, varying in size from an almond to a hen's egg—generally multiple, and then occurring as a series of distinct swellings, or as a mass of matted glands. The skin over a gland that is acutely inflamed may not at first be affected, unless the gland is superficial, but it soon comes to participate in the inflammatory action, and the cellular tissue around it also gets involved; and then the outline of the gland is generally obscured or lost. The pain is often very acute, and is increased by pressure and movement. Chills, followed by general fever, may accompany the local inflammation, and when suppuration becomes established in the gland we have the signs of abscess (before dwelt on) present.

*Chronic Adenitis* may result from the acute, or what is more common, the inflammation may have been chronic from the outset. This form of the affection is most apt to occur in the scrofulous and unhealthy, and to assume a very slow, lingering, and rebellious character. It is frequently connected with syphilitic disease, also with bone affection, chronic skin disease, and cancer.

The tumour formed is hard, of uniform firm consistence, circumscribed, indolent, rolling under the finger, and the overlying skin is unaffected. The tumour may be of such a size, or may be so placed, as to cause embarrassment to neighbouring parts by the pressure it occasions. In consequence of injury, a gland, thus chronically inflamed, may take on subacute action, and then the tissues lying over it become slowly implicated in the morbid action. The glands in the groin may become affected by chronic inflammation, in consequence of irritation seated at a great distance, as in any part of the lower extremity, especially in the neighbourhood of the toes and the instep. The source of irritation in these glands may also be found on the walls of the abdomen, about the genital organs, scrotum, the perineum or anus, consequently in any obscure case all these regions must be examined. Whether the tumour be placed above or below the flexure of the groin, along Poupart's ligament, or around the saphenous opening, will manifestly assist us in recognizing the place where the irritation is to be looked for.

An enlarged gland in the axilla may be due to an irritation in any part of the upper extremity, shoulder and back, front of the chest, mamma, or even in the superior portion of the abdominal wall in front, or at the side. The chain of glands lying along the lower edge of the posterior wall are those which receive the vessels from the back, while along the border of the pectoralis major lies the line of glands supplied by the vessels from the mamma and front of the chest. Adenitis affecting the cervical glands may be due to irritation in any part of a very wide circle. The large group of superficial glands lying above the clavicle between the sterno-mastoid and trapezius, are frequently enlarged, communicating as they do with the glands of the head and face, and the deep glands connected with the pharynx, œsophagus, larynx, trachea, and thyroid gland. The occipital, posterior auricular, and submaxillary glands are also very frequently the seat of enlargement.

The irritation causing inflammation in the glands of the neck may be seated on any part of the head; the face, and its cavities; the pharynx, œsophagus, larynx, trachea, thyroid gland, and upper part of the chest. In eruptions on the scalp, the occipital and posterior auricular are the glands most frequently affected—the parotid is very commonly inflamed in irritation in the upper part of the face and on the head; and the sub-maxillary, in any affection of the face, lips, jaws, teeth, &c.

The diseases with which adenitis in different regions may be confounded are phlegmon, hernia, undescended testicle, tumours of the cord, cysts, aneurism, lipoma, and fibrous or cancerous growths.

Sometimes it is very difficult to recognize the true nature of the swelling, but generally there is but little room for doubt. The age and temperament of the patient, the history, progress, and special characters of the growth, and its position, will be our main grounds for forming a judgment.

The circumscribed character of the tumour will distinguish it from phlegmon; and a close attention to the signs of hernia, given elsewhere, will prevent any confusion with it, though, when the gland is deeply placed, and especially when it is bound down under the fascia lata, and there is an arrest in the action of the intestinal canal, so much doubt may exist as to call for an exploratory operation.

The absence of the testicle from the scrotum will be the main point of distinction, together with the peculiar pain which pressure on the tumour gives rise to, between adenitis in the inguinal region and undescended testicle; and the history of the case, together with the peculiar characters of the tumour as revealed to the hand and eye, will guide us in distinguishing an enlarged gland from cysts or other tumours of the cord. The distinction from aneurism is to be made by attention to the characters of the pulsation (see p. 28). Any confusion between chronic adenitis and lipoma can only occur when the latter is small, and then the firm feeling and clear outline of the glandular enlargement will point out the difference.

The slow growth, its position, consistence, and mobility; the age and disposition of the patient, added to the absence of those peculiar characters which mark the other growths, will lead us to the distinction between adenitis and fibrous or cancerous tumours.

Enlargement of the sub-maxillary glands has been confounded with hypertrophy of the salivary gland; but the difference between the size of the tumours at the outset, the different ages at which these affections are met with (adenitis being seen in the young, and hypertrophy being very rare in early life), and there being usually several glands enlarged in adenitis, will point out the distinction.

**ANCHYLOSIS** (ἀγκολη, the bend of the arm—the bent position being frequently assumed by stiff joints). As all joints, however, do not assume this bent shape, the term anchylosis is not strictly applicable to all stiff joints; but as patients find the bent position the most easy, they commonly assume it to obtain relief, and thus the joint usually becomes fixed.

Anchylosis, then, means partial or complete fixture of an articulation. The terms "true" and "false," as applied to anchylosis (as suggested by Petit), and still occasionally used, mean the same as the more modern phrases "complete" and "incomplete;" "perfect" and "imperfect," as implying the entire or complete fixture of a joint. After Petit the term "false" acquired a much wider signification than it now obtains, as it was made to include all those conditions in which the movements of a joint were diminished by any disease. Anchylosis takes place as a natural process in the progress of time in some of the less movable joints, as in the symphysis pubis, the ribs, the coccyx, &c.; but in the case of the more movable joints it is a secondary or consecutive affection, which follows on disease or injury.

Complete anchylosis results from a union by bone between the articulating surfaces, and the consequent destruction of the joint. In such a case the articulating surfaces may remain entire, and bridges or stalactitic processes of new bone pass from the one to the other; or the union may result from the actual growing together of the bones, their articulating facets disappearing. In either case there is entire immobility established.

Incomplete anchylosis or fixture may result from a variety of causes, such as the formation of rough processes of bone growing from the edge of either articulating surface. These growths prevent the play of the bones on one another. The formation, too, of fibro-cellular connections between the bones, or the abnormal contractions or adhesions of the normal ligaments, tendons, or muscles in or around the joint; or even cicatrices in the soft parts in the neighbourhood of the articulation, may have the same effect. In this way the fixture may be due to causes within ("intra-articular") or without ("extra-articular") the joint, or both combined.

Before anchylosis has taken place, partial or complete displacement of the articulating surfaces from one another may have occurred, and the bones become fixed in their new position. Further, the articulating ends of the bones may have been more or less destroyed by disease, or deformed by the growth of new bone before displacement took place

In diagnosing anchylosis, it is of much consequence to bear in mind the vicarious action which the articulation proximal to the one affected frequently assumes, and how greatly the restricted action of the distal joint is replaced by the increased motion of the higher. If we overlook this fact, we may ascribe to the stiff joint a degree of mobility which does not belong to it, but which is borrowed from its neighbour. It is in the case of the hip and shoulder joints that this error is most apt to be made, as in the former the pelvis, and in the latter the scapula, assume a range of movement quite new to them.

In examining any articulation, in order to determine whether it be anchylosed or not, and what the degree of fixture may be, it is proper at first to observe what movements the patient can himself perform, and afterwards that the surgeon should communicate to the joint those motions which are best adapted to test its condition. Chloroform is always a great aid to the surgeon who conducts such an examination. From the pain which all movement in a diseased joint occasions, the patient will voluntarily fix the articulation in such a way as to cause error with regard to its real condition; and in hysterical affections the same voluntary fixture may result from morbid apprehension. All this is got rid of by the use of chloroform.

To determine positively whether the anchylosis is true or false, is by no means always easy. Scrupulous care must be taken solidly to fix the proximal bone, and only to apply to the distal one such movements as are requisite to determine the point at issue. In the case of the larger joints, an assistant will be required to fix the proximal bone. If there is complete solidity—an entire absence of all motion—then most likely we have to do with true anchylosis, although it is to be borne in mind, that firm fibrous union, or even very strong contraction of the ligaments (especially if combined with irregularity in the articulating surfaces which correspond to one another), may so completely fix the bones as to prevent any visible movement. If there is any motion apparent, then the anchylosis is certainly not by bone, and we term it incomplete.

If, during the attempts to move the articulation, acute pain is caused at parts of the joint other than those directly compressed by us, then it is most likely fibrous and not bony anchylosis we have to deal with. When the union is by bone no pain will be produced by our manipulations, except at the point compressed; while in fibrous anchylosis, the stretching of the false ligaments causes pain sometimes of the most acute description.

Having determined the completeness of the fixture, we next try if possible to discover its cause. Cicatrices; tumours near the joint; unreduced dislocations; fracture of the articulating ends of the bones; bony growths, or gouty concretions; rigidity of tendons; contraction of muscles; induration of the cellular tissue—must all be sought for, and an opinion formed as to whether the fixture is due to extra or intra articular causes. Many of these sources of anchylosis will be easily discovered, while others are difficult to recognize. If we find that the bones move easily in one way and not in the other, and that movements in which the muscles are relaxed are as difficult as those in which they are in action, then the state of the muscles and the cellular tissue on one side of the joint will call for careful examination. If on communicating movements we feel the contraction of a muscle or tendon, then it is probable that the evil lies there. If there has been much disease in the parts around the joint, and if they are felt hard and matted together, and especially if sinuses exist, then the cellular tissue will likely have much to do with the fixture. Lastly, the possibility of a state of long disuse and fixture (as in the treatment of fractures) having produced such a stiffness (if not more) of the articulation as to simulate positive anchylosis, must be borne in mind. An hysterical affection of a joint may be surmised by the disposition of the patient, the history of the case, and especially if an examination under chloroform points to such an explanation.

**ANEURISM** (ἀνευρυνω, I dilate or open.)—A tumour containing blood in connection with an artery.

Distinguished into (*a*) "Spontaneous" and "traumatic," according to whether it has resulted from a wound or not. (*b*) "True" and "false," according to whether there be a containing sac, formed of the coats of the vessel. "Arterio-venous" aneurisms are formed, as their designation implies, partly by an artery and partly by a vein.

A. *True Aneurism.*—Signs and Symptoms.—It is especially an affection of adult life. It appears most commonly between thirty-five and fifty, and is very rare indeed before puberty. It is sometimes developed with rapidity when it results from violence, but it is most generally slow of formation, and may be years attaining any size.

When it results from violence, there is frequently a sharp pain experienced in the part at the moment when the vessel is ruptured, and occasionally the sensation produced at once suggests to the patient the lesion which has occurred. Violent muscular exertion, in positions in which a great vessel is put on the stretch or pressed upon, especially if accompanied by blows over the course of the vessel, is most apt to make them yield in one or more of their coats.

When formed, an aneurism presents to us the following characters:—

1. *A tumour*, round or oval in shape, small at first and gradually augmenting, *placed over the course of an artery*, well-defined, soft, elastic, compressible. The skin covering it at first (and usually for long remaining) unchanged; generally accompanied by only slight uneasiness (in its early stage) while small; but when it has attained some size usually giving rise to violent paroxysms of pain, frequently of a most distressing nature.

2. *Pulsation* synchronous with the pulse. This, when decided, is the most characteristic of all the symptoms of aneurism. It is more marked in the tumour than in the artery itself on which the tumour forms. The characters of this pulsation are described at p. 28. Its strength is inversely proportioned to the size of the tumour. In a few rare cases, from the peculiar position of the opening of communication with the artery, and the state of the contents of the sac, neither pulsation nor bruit can be discovered in an aneurism; but these cases form a very rare exception to the rule. When the walls of the sac are very thick, from the deposit of blood laminæ, both the pulsation and sounds of an aneurism may be very difficult to detect. Gendrin has pointed out the occurrence of a double impulse in aneurism of the great vessels. One impulse is synchronous with the systole, and another with the diastole; the latter being followed by a certain movement of retraction

(arrested by pressure on the distal side), and occasionally by a distinct fremitus, or vibration, at the same time. This double movement is pathognomonic, and will always, when observed, distinguish an aneurism from all tumours receiving a transmitted movement, as these present only one impulse, which accompanies the diastole of the artery lying below them

Pulsation is perceived by the hand, and is usually apparent to the eye, and that even at some distance, when the patient is plethoric, and the affected vessel a large one.

3. *Compression applied to the tumour* diminishes it, and may even almost obliterate it if the contents are not consolidated, or the sac so large that it cannot be fairly acted upon. *When the pressure is removed*, the tumour refills, and that with an active, rapid, lively movement, which is very distinctive.

4. *Pressure applied on the heart side* arrests the pulsation and diminishes the size of the tumour, and if the aneurism is small, may permit even of its obliteration. If we thus arrest the current of blood, and also by direct pressure empty the sac, and then lay the hand over the tumour and allow the arterial current to be resumed, a very characteristic feeling of expansion will be communicated to the hand.

5. *Pressure applied on the distal side* produces results the opposite of those just referred to. The pulsations in the tumour are increased in intensity, and the shock communicated to the hand becomes shorter, more abrupt, and more decided; and if the movement of retraction was before apparent, it will now be arrested, as will the second impulse. The size of the tumour, too, is augmented, if it is at all changed.

Any mental or bodily cause which hurries the circulation will increase the pulsation and the sounds, as will also an elevated position of the part.

If we compare the vessels of the two limbs, we will find that those lying distal to the affected artery beat more feebly than the corresponding vessels in the other limb. This comparison can, in doubtful cases, be well accomplished by means of the sphygmographe.

This diminished pulsation in the distal vessels is partly due to the direct effect of the diverticulum caused by the aneurismal sac, and partly to the influence of pressure.

6. *Sounds communicated to the ear.*—These vary considerably in character, from a soft blowing sound to a harsh rasping note, according to the size of the pouch, the state of its contents, the freedom of communication with the artery, and the smoothness and regularity of the opening. The bruit is intermittent, and occurs as the sac fills.

It is of much consequence that we do not mistake either the cause or the nature of the sounds heard in an aneurismal tumour. Any pressure acting on a large artery, as that caused by a neighbouring tumour, or even by the stethoscope too firmly pressed on the vessel, may give rise to a sound which, though shorter and duller, we might easily mistake for the sound above spoken of. In a state of general anæmia, also, and in such an affection of the aortic valves as permits of regurgitation, sounds are produced which resemble those met with in aneurism; but in anæmic persons the bellows sound is not unfrequently observed throughout the whole of their arterial system, and there is the murmur in the veins of the neck in these cases also to guide us.

Again, the bruit, which is so valuable a sign of aneurism when it is present, may be wanting altogether, and yet the tumour be a true aneurism. This may occur when the orifice of communication between the sac and the artery is very small, and when the sac projects much, and is filled with hard clot. It is in sacs which are but half filled that the sounds are best heard; so that in any case if we can half empty the sac, or by position take the pressure off the column of blood acting on them, we will be the better able to distinguish the sounds.

With regard, then, to the sounds above spoken of, when they occur in a tumour resembling an aneurism, it would seem that they are highly confirmatory of its aneurismal character; but that they are by no means pathognomonic.

All the signs of aneurism hitherto mentioned undergo modification when the tumour has existed for some time, and the contents have become more or less consolidated. The softness and compressibility of the tumour are lost; it expands less to the impulse of the heart; is not in the same way affected by pressure; and the sounds caused by the blood circulating in its interior are less distinct. If consolidation becomes complete, then the distinctive characters of the tumour are gradually lost, and a hard, incompressible, unreducible, non-pulsating tumour remains, which can only by its history be distinguished from other solid growths.

7. A further group of symptoms connected with aneurism depend on the pressure exerted by the tumour. These effects may of course be caused by any tumour producing the same amount of pressure; and are thus, if considered unconnected with other circumstances, not distinctive of aneurism. The play of muscles and tendons may be embarrassed by such pressure; the movements of joints may be interfered with; and various effects result from the pressure on nerves and the hindrance of the circulation in the vessels carrying the blood and lymph.

Coldness, numbness, and œdema of the limb; a feeling of stiffness and weariness, and sometimes even great pain shooting in paroxysms along the nerves—are symptoms referable to the same cause. If a bone is so severely pressed upon as to undergo erosion, then a constant gnawing, aching, and wearing pain will be complained of. The functions of organs and canals, too, may be obstructed, and spasm of distant parts produced by such pressure acting on nerves.

If an aneurism tends to burst externally, the skin will become adherent to the sac, and get thinned; an eschar will form and separate, and thus the blood will burst out. The most prominent part of the tumour becomes most tense; in this it is different from an abscess in like circumstances, the projecting portion of which is softest and most relaxed. Occasionally an abscess forms between an aneurismal sac and the surface, and then we will have all the signs of inflammation followed by those of suppuration apparent, and ultimately there will most likely be a communication formed between the sac of the abscess and the artery. When gangrene seizes on the sac, it will be gradually separated and expelled; its death being indicated by an arrest of the pulsation, together with coldness and lividity of the part.

An aneurism has been mistaken for an abscess, and *vice versâ*, even by surgeons of the highest repute. This is of course an error of great gravity. The distinction is to be made by observing the following points, most of which, it will be noticed, serve to differentiate aneurism from any tumour reposing on an artery.

(1) *The history and progress of the case.*—In abscess there will be pre-existing acute or chronic inflammation. Cold abscess occurs most frequently in young lymphatic or scrofulous patients; aneurism, on the other hand, is commonly met with in the strong and apparently athletic adult. Abscesses in their progress soften from the centre outwards. Aneurisms, on the contrary, consolidate from the circumference inwards. In abscess we have fluctuation; but not in aneurism, except under very rare circumstances.

(2) *The pulsation* in aneurism is excentric, while in abscess it is a mere heaving. The pulsation, too, in the case of abscess, though in certain circumstances very clear, is never so marked and distinct as that observed in nearly all cases of aneurism, holding the same relative position to the hand.

(3) *Pressure on the heart side* does not diminish an abscess as it does an aneurism; and if the pressure thus applied be suddenly withdrawn, the pulsation will reappear immediately in an abscess with full force, while in aneurism it takes a few beats before the full momentum is regained. If the tumour is placed very near the trunk, we may, however, be unable to employ this test.

(4) If we can *displace the tumour* from the course of the artery, by raising or pushing it aside, then its non-aneurismal character will be evidenced, as the pulsation will cease.

In some few cases a very projecting sac ("sacciform aneurism") has been apparently so grasped and raised from the artery, as to give the idea of displacement and its being unconnected with the vessel; but in such cases the pulsation is not arrested, when it is so apparently raised.

There are doubtless some situations in which the test just alluded to cannot be applied to an abscess: as when the pus comes from a cavity, such as the thorax, and points through a small aperture; or when the abscess rides over an artery like a saddle; or, worse still, when the artery runs through the cavity of an abscess, as in this last condition, the pulsation, though not so strong as in an aneurism, will still be expansive, and not a mere heaving. In such rare cases as those last referred to, a careful examination will show that the pulsation is only or mainly apparent along the course of the artery; and that it is not equally evident on all sides of the swelling (as it is found in aneurism), but is marked at one side or at one part more than at another.

(5) Further, as a rule, abscesses are not *reducible*, as aneurismal tumours so frequently are. In some situations, this test cannot however be relied on. Cold abscesses in the groin, proceeding from the spine, are frequently reducible to a considerable extent, and small abscesses in the axilla and root of the neck may present the same anomalous character, but when the pressure is removed from such tumours they refill slowly, and not with that elasticity and rebound observed in an aneurism. Besides, in the case of an abscess in the groin, we will have pre-existing or accompanying symptoms of disease of the spine to guide us, and when the pus is pressed up into the abdomen we will be enabled to trace the artery.

(6) Again, the *sounds* recognized in aneurism will be very rarely heard in connection with an abscess. True, when the communication between the artery and the sac is very free the distinctive sounds of aneurism may be lost, or rendered so feeble as to be easily mistaken for those sounds which result from the simple compression of an artery. When sounds are transmitted from an artery through a purulent collection, it is only observed when such collection has attained a great size; while in an aneurism they are evident from the first. In an abscess, too, it is a single sound only that is heard, and not the double sound—the whirr and the shock and the retraction of an aneurism.

In cases where doubt still remains, after such means of discrimination as the above have been employed, we must wait and re-examine repeatedly. We are seldom justified in using the exploring needle, but if it is employed, it must only be when we are prepared, if the tumour turn out to be an aneurism, to tie the vessel.

The co-existence of aneurism and abscess, as when the latter lies over the former, will of course render the recognition of the true character of the tumour still more difficult. Delpech first pointed out the occasional occurrence of this condition, and how true phlegmonous inflammation sometimes became established in the neighbourhood of an aneurismal sac. The history and progress of the case must be here carefully examined; and the existence of a pulsating tumour *before* the appearance of the soft fluctuating swelling now present, anxiously inquired for, while the exact limits and features of the tumour, and of its pulsations, will next have to be determined.

The differential diagnosis between aneurism and an erectile tumour, and between it and encephaloid cancer, is often far from easy, and is sometimes confessedly impossible. In such tumours we have frequently a consistence similar in all respects to aneurism, and the pulsation, sensation of blood return after pressure has been applied, sounds heard on auscultation, and imperfect reducibility, are with difficulty, if at all, to be distinguished from the same conditions as observed in aneurism. It is only by a careful consideration of the history of the case (especially in its early period); its origin and progress; the position of the tumour (there being probably no vessel of sufficient magnitude at the part to give rise to such an aneurism); the want of such a circumscribed defined outline as we find in aneurism; and the non-interference with the circulation in the arteries distal to the swelling, together with those other characters which are noted below, that we are able to recognize the true nature of such tumours.

*Encephaloid tumours* will usually manifest their nature by the cachexia which accompanies them; the age at which they appear; their rapid and often painful progress; and their being frequently multiple. Further, they are usually irregular to the touch (tense and elastic at some parts and semifluctuant at others), as contrasted with the more uniform consistence of an aneurism. The glands in the neighbourhood may be also affected, and the superficial veins prominent and tortuous. Encephaloid cancerous tumours are also generally hard at their outset, and ultimately soften. They do not at first pulsate, and when pulsation appears it is merely a heave. The bruit is more sighing, softer, and more prolonged, or sharper and quicker. They are little reducible, and are but little diminished by pressure applied to the main artery or on the heart side.

*Pulsatile tumours* of bone are generally cancerous in their nature, and besides the signs derived from their malignant character, above referred to, they are recognized by being usually seated in the ends of the long bones, and in positions where there is no artery large enough to occasion such an aneurism. In these tumours the pulsation is more abrupt and less expansive, and generally not attended by any bruit. If a bruit is observed, it is not so marked or distinctive as that which is met with in aneurism. Besides, there is frequently a peculiar thrill or vibration accompanying the beat in such cases, and the force of the pulsation is not proportioned to the size of the tumour, as it is in aneurism. Again, if the bone is expanded by the tumour, or if plates of bone exist on its walls, which crackle parchment-like on pressure, then the nature of the growth will be apparent, as an aneurism does not expand a bone but drills a hole in it. Though not expanded, the tumour and the bone will be found to be firmly incorporated with one another. Finally, the outline of these tumours is not so defined as that of an aneurism. Their base is lost in the underlying bone. Their consistence too is irregular, and when, by pressure applied to the main artery, the tumour is reduced, fluctuation becomes apparent, and the excavation which they occasion in the bone can be usually felt.

*Erectile tumours* have a spongy feeling; are comparatively superficial; are ill defined; the skin is very frequently implicated; the pulsation and bruit are very feeble; and the expansion much less decided than in aneurism. In aneurism the movement is from one centre outwards, while in erectile tumours there are many centres of pulsation. Lastily, pressure on the capillary side does not augment erectile growths.

To distinguish aneurism from these pulsatile tumours is often, however, most puzzling. We must examine them again and again, as features may be recognized at subsequent inspections which failed to arrest our attention at first, and in all cases of doubt we must act with great caution.

When consolidated, an aneurism may be confounded with any other solid tumour. It has been mistaken for a cyst, a fibrous, adenoid and scirrhous tumour, and even for an exostosis. It is chiefly at the root of the neck and in the popliteal space that the confusion has arisen. The history of the case will here be most important. If the parts are lax the necessary examination will be much facilitated. We may be able to raise up or laterally displace, and so isolate, a solid tumour lying over the vessel, but we cannot obviously so act on an aneurism. In this way the influence exerted by the artery upon the tumour —movement and sounds—will be arrested. We may in like manner be able to trace the vessel clear of the tumour. The irregular outline of many of these solid tumours, the pulsation in them being a mere comparatively feeble heave, and not uniform, but confined to or being more marked on one side; and further, the pulsation not being present at first, but only after the tumour has attained some size, will all assist our diagnosis. Pressure on the tumour, or on the main vessel above, or on the distal side, does not affect their bulk as it does that of an aneurism; and lastly, the distal vessels are not affected, as may be shown by the use of the sphygmographe. As to glandular tumours, it may be said that they are generally met with in young strumous subjects, and aneurism in athletic adults—that they are commonly multiple, advance rapidly, and then either remain stationary, diminish, or suppurate.

B. *Traumatic Aneurism*, or that which follows a wound in an artery. "Primary diffused," or "false aneurism" (*i.e.* when the blood is at once effused into the tissues—in short, a ruptured artery), and "secondary" or "consecutive false aneurism" (when a sac incloses the effused blood), are different varieties of traumatic aneurism. The last species referred to is also termed "false circumscribed," "mixed external," "encysted," and "false sacculated" aneurism. The wounding agent in either case may reach the artery from without, as in a stab, or injure it from within, as when a fragment of broken bone wounds the vessel. Such aneurisms have also been observed to arise in rare cases from severe blows, even without a wound. In cases in which there has been an external wound, the presence of a cicatrix on the surface will be an important guide to us in recognizing the nature of the case.

In primary diffused aneurism the limb swells along the course of the vessel, in the first instance, and ultimately throughout its whole circumference. This swelling is without distinct bounds, and shades off into the surrounding parts. The skin, at first unchanged in colour and temperature, gets stretched and tense, if the escape of blood is great and goes on unchecked, and as the circulation becomes affected by the diversion of the blood from the tissues, and by the pressure it occasions, the limb becomes swelled, œdematous, tense, congested (even livid) and cold. From the tense and swollen state of the limb, the pulsation in the tumour is often obscure, and occasionally even inappreciable, especially at the circumference; but as the size and freedom of the opening in the artery mainly regulate the force of the pulsation and murmur, considerable difference may exist in their pronunciation. A gentle quiver or fremitus is usually apparent in the swelling near the point where the artery has been opened, or when there is a pulsation in the body of the tumour, it may shade off at the circumference into such a tremor. The swelling is very elastic at some points, semifluctuant, and at others brawny to the hand. Further, if the injury to the vessel has been very great, then all pulsation in the artery distal to the tumour will cease.

As the case proceeds, the constitution becomes gravely affected, and fever of an irritant or typhoid type is apt to become developed.

The coagulation and consolidation of the effusion, or its conversion into pus; the obliteration of the artery, and the absorption of the effusion; or, finally, the establishment of gangrene, are events in the progress of the case which will indicate themselves by appropriate signs.

In "consecutive false aneurism," the presence of a containing and circumscribing sac introduces a most important element into its character, and renders its features similar to those before dwelt upon, as being indicative of true spontaneous aneurism. Such an aneurism is slower in its development, and in producing those effects on surrounding parts which were before described as resulting from true aneurism.

C. *Arterio-venous Aneurism*, or a tumour containing blood, having a connection with both an artery and a vein. Usually there is but one artery and one vein involved, but cases are not wanting in which two veins and an artery have had communications established between them. In one species of arterio-venous aneurism the communication between the vessels is direct—the artery pouring its blood straight into the vein. In other kinds there is a sac, through the intermediation of which the connection exists.

The terms, "aneurism by transfusion," "aneurism by anastomosis," "varicose aneurism," and "aneurismal varix," have been applied to these arterio-venous communications. Arterio-venous connections usually result from a punctured wound, but may be the consequence of a wound from a musket-ball, or from small-shot, or may arise from the spontaneous ulceration caused by disease or injury.

In the case of a wound the weapon may transfix both artery and vein, or, passing through the vein, wound the artery beyond; or yet, penetrating between the vessels, open both at once. In either case a different pathological result will be produced. The greater force of the arterial current, and the greater tension of the arterial walls, cause the flow of blood to be towards the vein, if no sac exists, and thus a continuous flow of arterial blood into the vein becomes established.

The sac through which the communication is carried on may be variously placed, as regards the vessels, according to the nature and position of the wound. The sac may lie directly *between* the vessels and communicate on either side with them; although the openings may be so close together as to appear as one. This position of the sac is that most commonly met with, yet sometimes it projects laterally from between the vessels, the communication being to one side.

Again, the sac may lie *beyond* the artery on the side remote from the vein, when the vessels have been pierced from side to side; or it may lie *superficially* to the vein, and between it and the surface, and thus on the side of that vessel distant from the artery, in which case the arterial blood traverses the vein to reach the sac. When there is a direct communication between the artery and vein, without any sac, the term "simple arterio-venous aneurism," or "aneurismal varix," is applied to it. When there is a sac, however it may be placed, the term "false consecutive arterio-venous aneurism," or "varicose aneurism," is used. This last is just a false consecutive aneurism communicating with a vein. Finally, we may have a union of both forms of the affection.

As to the position in which these aneurisms occur, they may be met with in any situation where an artery and a vein of sufficient magnitude lie in contact. It has never been seen to occur in any vessel below the size of the posterior tibial. The facility for communicating between the vessels must be considerable, otherwise, after a wound, the blood will escape into the tissues, and not pass from one vessel into the other.

As resulting from disease, arterio-venous communications have been met with between the thoracic aorta and the vena cava superior; and between the abdominal aorta and the inferior cava; and they have also been seen between the femoral vessels.

As resulting from a wound, arterio-venous aneurism is most common at the bend of the elbow; but it may occur in many places, as in the carotids, subclavian, femoral, popliteal, posterior tibial, &c.

*Signs of direct arterio-venous communication.*—We have an indistinct tumour present, which is usually of an elongated shape, shading off into the surrounding parts. If near the surface, it will have a blue or purple colour, especially when the part is dependent. The skin is generally unchanged. If it has resulted from a wound, traces of the puncture will be observed, and the position occupied by the tumour will be that where an artery and vein of some magnitude are in close contact. The tumour is in itself painless and of slow growth. The implicated vein soon becomes enlarged and tortuous, and frequently forms large pouches. Its walls become greatly thickened, so as to resemble the coats of an artery. The vein is forced to carry more than its own blood, and its peculiar functions are almost annihilated by the entrance of arterial blood into its canal.

There is a beat synchronous with the pulse, which is apparent in the enlarged vein for a considerable distance towards the trunk. The artery above the place of communication is frequently enlarged and even tortuous, and pulsates with preternatural force; while, below the place of communication, its functions being to a great extent in abeyance, it is said to become diminished in the strength and thickness of its walls, and certainly imparts but a feeble impulse to the hand.

A peculiar fremitus, or tremor, which is so characteristic of arterio-venous communications as to be looked on by some as pathognomonic, is easily perceived in the tumour both by the hand and ear. This fremitus extends along the vein for some way, and is quite distinct from the slight thrill which occasionally accompanies the bellows sound in ordinary aneurism. It has been variously described, and many similitudes from familiar things have been sought for it. It has been likened to the purr of a cat; the buzzing of an insect in the air or in a paper bag; the prolonged utterance of the letter *r:* the sound of a grater, a file, or a saw; the distant noise of machinery at work, or of wheels on the road; the first sound of water boiling; the noise produced by immersing a hot iron in water; the sound of a distant rivulet; the low bass note of a violin slowly played, &c. &c. Such are some (not all!) of the resemblances which have been sought for the peculiar sound referred to. It is usually perceived by the patient as well as by the surgeon, and that sometimes so distinctly as to destroy his sleep, and persuade him that there is an insect imprisoned in the part.

A continuous blowing sound (*souffle à double courant*) is heard by the stethoscope for a considerable distance along the vein. This *souffle* is augmented at the moment of the arterial diastole, and its continuous character distinguishes it from the sound which belongs to a true arterial aneurism. The *souffle*, together with the fremitus above described, is due to the passage of the arterial blood into the vein through a narrow orifice, the sides of which quiver in the current.

A dependent position augments, while an elevated position diminishes, all the signs which are characteristic of arterio-venous aneurism.

Pressure over the tumour dissipates it so long as such pressure is maintained; but whenever it is removed the swelling reappears. If pressure is applied to the artery on the proximal side, the tumour is diminished or disappears; while any compression on the distal side notably augments its volume. Pressure applied to the vein on the heart side will arrest the pulsation above that point, but intensify it on the distal side; while pressure on the vein on the peripheral side of the tumour will produce little or no effect in varying the signs of the affection.

Further, the derangement which the circulation of the limb undergoes, in consequence of the diversion from its legitimate distribution of the arterial blood, and the embarrassment of the venous circulation from the occupation of the vein by foreign blood, adds some very marked and intelligible signs to those already enumerated. In the upper extremity the inconvenience occasioned by the malady is greatly less than what it is when it is seated in the lower. Sometimes the annoyance is very slight; but at other times the sensation of heaviness and coldness in the hands, and the want of power in the forearms, gives much disquietude. In the lower limbs, in aggravated cases (by no means in all instances), a feeling of weight and fulness amounting to absolute pain, coldness, œdema, rebellious ulcers, sometimes loss of sensation in the skin, feebleness, and atrophy result. When there is a sac, the affection is a more troublesome and dangerous one than when the communication is direct between the vessels. In such a case it is a combination of circumscribed traumatic aneurism and aneurismal varix, and the signs by which the affection is characterized will partake of those belonging to each of these maladies. We have the bellows murmur of an arterial aneurism, and also the harsh rasping buzz and fremitus of arterio-venous communications. This combination is the most important diagnostic sign, and should be carefully sought for; the tremor being looked for not merely in the tumour, but also in the vein leading from it. When the limb is allowed to hang down, these sounds will be heard at a considerable distance. Besides the indications of obstructed circulation and its effects on the temperature and power of the limb, before dwelt on, we have in this lesion a more defined and circumscribed tumour, which, from the deposition of clots within it, is often hard to the touch. Pressure more or less completely empties the tumour, although it cannot be made to disappear however such pressure be applied, on account of the clots in its interior.

If the sac is on the far side of the vein, the signs of aneurismal varix may completely mask those of traumatic aneurism, unless by pressure we overcome the influence of the interposed vein, and so get at the sac. When the sac is superficial to the vein, then the signs of traumatic aneurism (*i.e.* of the arterial lesion) will prevail over the venous symptoms.

D. *Circoid Aneurism*, or arterial varix, consists in an enlargement of an artery both as to length and circumference. In consequence of its increased length the artery becomes tortuous and serpentine, and pouches or sacs (which are true aneurisms) form at various points. The coats of the vessel become thinned. It is on the vessels of the head that circoid aneurism is most usually met with—on the temporal, posterior auricular, and occipital vessels; and in these cases the true character of the affection is of comparatively easy recognition; but when it occurs in the forearm, leg, popliteal space, thigh, or in the iliac arteries, and is of limited extent, it is not always so easily made out.

The diameter of the part in which circoid aneurism is placed is somewhat increased; but unless the skin has become thinned, or the affected vessels are superficial, no effect is produced on the integument lying over it. There is generally no difficulty by palpation in discovering the tortuous, convoluted vessel which pulsates (with the systole of the heart) expansively and freely throughout its whole extent, and communicates to the ear a loud, continuous, and harsh sound. The tumour or swelling present is soft, elastic, and diffused. Pressure on the heart side arrests the movement and sound, while position has little effect on it. The enlargement may implicate a considerable extent of the vessel, and may even involve several trunks and their branches.

Circoid aneurism may be confounded with

(*a*) Arterio-venous aneurism, *when it occupies certain positions* (only), and also with erectile tumours. From the former affection it may be distinguished by being almost always congenital or spontaneous; being diffused over a larger area; not disappearing on direct compression; the skin not being discoloured; the greater dispersion and more equable development of the pulsation and bruit; the absence of those peculiar sounds described under the head of arterio-venous aneurism; and the negative effects of position on the condition of the tumour. In circoid aneurism, moreover, the bruit is continuous and jerking, and the thrill is equally intense over the whole tumour, and not more marked near the point of communication between the artery and vein than at other parts, as it is in arterio-venous aneurism.

(*b*) From erectile tumours circoid aneurism is distinguished by the pouches which exist, and the ability we possess usually to trace out the distinct arterial convolutions. The more marked pulsation also, and its being frequently traceable to separate cords beneath the surface, and not arising, as in erectile tumours, from one mass. A certain fluctuation is also frequently apparent in the enlarged and thinned vessels.

ANGEIOLEUCITIS. *See* LYMPHATITIS.

ANKLE-JOINT. *See* DISLOCATION and FRACTURE.

**ANTHRAX.**—An inflammatory swelling or carbuncle, which consists of a circumscribed inflammation of the subcutaneous cellular tissue, leading to its death and expulsion. It may arise as a simple affection, or be an accompaniment of very serious constitutional ailments, such as glanders, plague, diabetes mellitus, Bright's kidney, gout, &c. It occurs in persons beyond middle life who are of plethoric or feeble habit of body, or irritable constitution, or who are intemperate in eating and drinking. It may occur in any part of the body, but is generally met with where there is cellular tissue rich in blood-vessels. It is especially on the posterior surface of the trunk that anthrax occurs. It is rare on the limbs.

*Symptoms.*—A feeling of prickling, itching, or heat in the part is followed by redness, swelling, dark livid discoloration, and a throbbing, tensive, burning pain. The part gets brawny and shining. The tumour does not "point," but remains flat, though it may be as a whole elevated above the surface. There is a large circumscribed, deep-set base, having sometimes little boils, at other times small turbid vesicles around its circumference. In time the surface gets honey-combed by small ulcerous openings, which exude a dirty, scanty, irritating, thin, fœtid pus, the amount of which may be increased by applying pressure to their neighbourhood. The cellular tissue is seen through the apertures to be in a sloughy condition, and frequently has the sodden appearance of wet tow, mixed with curdy flakes of lymph. The destruction of the cellular tissue is really more extensive than it seems, and it is walled in by hard organized lymph. The epidermis peels off the surface.

The local affection is preceded or accompanied by constitutional symptoms of considerable severity, which appear early. At first inflammatory fever sets in, preceded by a rigor, and tending to become typhoid; and, it may be, ending in delirium and rapid sinking. Complications attend the affection in certain regions. Thus, when it is seated on the face, we may have embarrassment of mastication, the mouth, eye, or nose may be closed—in the neck, deglutition and respiration may be rendered difficult—on the chest, the respiratory movements are embarrassed, and pleurisy may result—on the abdomen the functions of the viscera may be interfered with, and peritonitis follow.

The affections with which it is possible to confound anthrax are—(*a*) Phlegmon; (*b*) Phlegmonous erysipelas (at its outset); (*c*) Malignant pustule; (*d*) Boil; (*e*) Bedsore. The distinction is made by observing—

1. The history of the rise and progress of the malady. In this way it is distinguished from *b*, *c*, and *e*.
2. Large size (from *c* and *d*).
3. Age and disposition of person affected (*a*). Boil occurs in the young and vigorous.
4. Position. May occur on any part; but it is chiefly on the back that anthrax is seen, and not especially on exposed parts, as *c;* and it is not especially on the parts most liable to pressure, as in *e*.
5. Not contagious (*b*, *c*).
6. Several small openings (*d*, only one).

From common boil, its size, its not pointing, its occurring in old and feeble persons, its having many openings, being of a darker red, and having a deeper base, will distinguish it.

Malignant pustule begins as a small pimple after inoculation. The local affection is the leading feature in the case, and the constitutional symptoms follow; while the reverse is the case in anthrax. The pustule passes from the surface inwards till it affects the constitution; anthrax comes from within outwards, producing a local lesion. Anthrax appears on parts that are covered, and not especially on exposed parts, like the malignant pustule, which, too, forms a large elevation on a hard, limited, but well-defined base.

**ANTRUM,** Tumours of the.—The antrum may be distended by fluid or by solid tumours. The former may consist of pus or various other fluids. The latter may be simple or malignant.

A. *Fluid Collections.*—When the amount of fluid is small, little or no effect is produced in the size of the cavity; but when the amount is great, the walls of the sinus are bulged, so that they are enlarged in one or more directions, being projected either upwards into the orbit, causing the eyeball to project; inwards, effacing the nostril; downwards, depressing the roof of the mouth; and outwards (most common), bulging the cheek. The bone, in one or all of these directions, becomes in time thinned or absorbed, and thus the fluid collection, covered by a thin osseous scale, crackles to the touch, like parchment; or when entirely freed from its bony covering, it may point at the place where it has made its way to the surface. If the bone is enlarged in all directions, the lacrymal duct will be closed and epiphora be produced, and the functions of respiration, mastication, deglutition, and speech will be more or less interfered with. Such interference is much more apt to arise when the antrum is occupied by a solid tumour, as it usually presses with great force, inconsequence of its generally attaining a great size.

The same parchment-like crepitation, above spoken of as being observed in fluid collections, may be present in solid tumours when they have caused absorption of the bone.

The first point of distinction we have to draw, then, is between solid and fluid distension of the cavity. This distension will depend on—

(1) The history of the case. That attending the different fluid and solid formations is distinct, as we will see.

(2) Fluids commonly distend the whole cavity equally, and

do not usually project markedly in one direction alone, as solid tumours do.

(3) Fluid collections are most generally quite indolent (except in acute abscess), and after a time fluctuate.

(4) The soft parts over the bone are not, in the case of fluids, incorporated with the enlargement.

(5) In fluid collections there is usually some discharge of a similar character to that contained within the antrum by the corresponding nostril or by the socket of a tooth. In the former case it takes place only when the patient lies on the side opposite to the collection, or during a forced expiration, as the communication with the nostril is high up close to the floor of the orbit.

(6) If absolutely necessary an exploring needle may be introduced, to determine the character of the contents.

(*a*) The distinction between purulent and mucous accumulations is made by observing that an abscess is preceded by signs of inflammation; that its outset is generally marked by chills and flushes of heat; by severe pain in the antrum, shooting to the nose, eye, forehead, and ear, and increased by percussion. That it follows, as a rule, disease of the root of a tooth or necrosis of the bone; or results from injury; or arises from the bursting of a neighbouring purulent collection into the cavity—that it is attended by swelling, hardness, and tenderness, and sometimes by œdema of the cheek, and by general pyrexia—that the pain, from being of a shooting or fixed character, becomes throbbing and heavy—and lastly, that pus escapes by the nostril, or by the side of, or through, the socket of a tooth.

(*b*) Again, we conclude that the collection is in the sinus and not in a cyst lying without, by observing whether the walls of the sinus are displaced by it—whether the nasal cavity is pressed upon, the cheek bulged, and the eye displaced—if so, the collection is within the sinus. If these things are not observed, then the collection is *probably* not within the sinus. After opening the cavity, an inspection of the interior will at once enable us to judge.

The pain which attends inflammation of the antrum, it may be added, is much more severe and prolonged than that of ordinary toothache—it extends more to surrounding parts, and is accompanied by more pyrexia and constitutional disturbance.

(*c*) *Cysts*, containing various fluids of different degrees of consistence, occur occasionally in the antrum. Generally the contents are glairy mucus, mixed with cholesterine scales. Such collections increase slowly, and without pain, and occur without evident cause. The swelling is at first hard, and then becomes elastic. It is round and smooth. The mucous membrane of the mouth is healthy. This affection occurs mostly in young persons, and the general health is unaffected by it. If any fluid escape by the nostril or gum, the nature of the malady will at once be recognized, or if a curved needle is inserted into the cyst, some of the fluid may be obtained for examination.

B. *Solid Tumours* of many kinds are met with in the antrum. Polypi are rare, but occasional occupants of the cavity. Fibrous and erectile tumours, and soft cancer, are the most common of the solid growths.

These tumours may so expand the walls of the sinus as to cause great deformity, and embarrass the functions of the nostrils, lacrymal duct, mouth, and throat by their pressure. So long as these tumours remain concealed within the bone, little can be determined as to their true character; but so soon as the bone has become absorbed and they are allowed to project, their individuality may be discerned.

(*a*) The distinction between simple and malignant tumours is thus made:—

(1) Rapidity of growth. The increase of malignant tumours is much more rapid than that of simple ones.

(2) Consistence. This can only be judged of when the bone has been absorbed. Most of the simple growths are firm, lobed, and smooth. Medullary cancer is soft, bossy, and elastic to the touch, and probably pulsatile.

(3) The tissue of simple tumours, when exposed, is firm; does not pour out a fœtid or profuse discharge; and if it ulcerates, it does so only late in its progress, and that superficially; and if it bleeds it does not do so profusely. Malignant

disease, on the other hand, is soft and lacerable; gives out a sanious, fœtid, and profuse discharge, ulcerates early and deeply, and bleeds profusely.

(4) The mucous membrane and integuments of the mouth and cheek are healthy in simple, and diseased in malignant tumours.

(5) The veins of the cheek are prominent and marked in malignant, and scarcely, if at all, so in benign tumours.

(6) The teeth are early loosened in cancerous disease, and fungous sprouts may protrude through their sockets. The nasal duct is early obstructed. It is not so in simple tumours.

(7) The glands below the jaw, behind the ear, and in the temporal region, are early affected in cancer, but escape implication in simple tumours.

(8) The neighbouring parts are rapidly encroached on, and become blended in the mass of cancer, which quickly insinuates itself into the fissures and between the bones of the face and skull. This is not the case in simple growths.

(9) The pain is severe, sharp, and lancinating in cancer; slight or absent in simple tumours.

(10) The general health is unaffected in benign tumours, and except what influence their mechanical effects may have, they cause little annoyance. The general health, again, is gravely compromised in malignant disease—the face becomes sallow and anxious, and the body soon gets emaciated.

(11) As to age, very little information can be got to assist the diagnosis. Cancer may occur at any age; but on the whole malignant disease is more common in middle life and in old persons, and simple growths in the young.

(12) If a small portion of the growth can be detached and examined by the microscope, the character of the tumour may be at once determined.

(*b*) In order to decide whether a tumour is situated in the antrum, or in the fissures behind the superior maxillary bone, we observe—

(1) Whether the whole bone, retaining its normal outline, is pushed forward; or whether one or more of the walls of the sinus are alone projected.

(2) Whether the line of the teeth is regular, or the reverse.

When the tumour is behind the bone, it protrudes it bodily; the line of the teeth remains normal, and the outline of the bone is unaffected. When the growth is in the antrum, the effect is the contrary.

**ANUS**, Affections of the.

A. **Fissure.**—This consists of a small crack in the interior of the gut, frequently combined with an ulcer, and often terminating in a small cutaneous projection on the margin of the anus. If recent, its sides are pliant and soft; if old, they may be hard. Fissures occur most commonly in adult females of sedentary habits and nervous hysterical disposition, who are weak and irritable and suffer from constipation. Men of feeble vigour are also not unfrequently so affected. It is not an uncommon accompaniment of syphilis. It gives rise to (1) Pain, (2) Contraction of the sphincter, (3) Sympathetic irritation of neighbouring parts.

(1) The pain is generally excessive, and of a burning, boring character; but it varies considerably in degree. It is worse when there is an ulcer combined with the fissure, and such ulcer lies just within the grasp of the sphincter. Generally speaking, the suffering is very much greater than we could expect to accompany so insignificant a lesion. The pain sometimes undergoes periodical exacerbation, as in the female during menstruation; and it may be notably aggravated by any exertion which forces the diaphragm downwards, as singing, coughing, &c. The pain is augmented by the act of defecation, especially if the dejections are large, hard, and dry; but it is not always very severe just at the moment of defecation, but may come on shortly afterwards, and continue for an indefinite time. In some cases the pain is constant, both between and during the acts of emptying the bowel, but is so aggravated by going to stool, that days are passed by the patient without relief being sought. The pain is not always at the anus, but may radiate into all the parts around. It may be complained of in the interior of the pelvis, high up the rectum, in the back, on the hips, and even down in the thighs, and along the urethra and spermatic cord. It may closely simulate neuralgia, and be

so constant and severe, that the patient is reduced to great misery, being unable to sit long in any posture. He usually sits on one hip.

(2) The spasmodically contracted state of the sphincter is generally very evident and distressing. The finger cannot be introduced without giving great pain.

(3) The sympathetic irritation of the urinary organs is occasionally so marked as to become the leading symptom, and to distract the patient's attention from the real seat of the complaint. Retention, or painful micturition; symptoms of stricture; pains which are erroneously supposed to arise from sciatica or rheumatism; emissions of semen or mucus; and in the female irritation of the uterus, may all arise from this cause.

In bad cases of fissure, the appearance of anxiety and dejection, the evident constitutional irritation and depression, are difficult to account for by so trifling an affection, unless the acute pain be considered.

B. **Ulcer** is often combined with fissure—the latter leading from the former to the edge of the bowel. The symptoms are the same as those of fissure. The ulcer presents itself as a small oval superficial breach of surface within the bowel, and lying in general between the longitudinal folds and in the sinuses which the mucous membrane forms just above the sphincter. An ulcer is usually found at the posterior part of the bowel near the coccyx, though more rarely it lies at the side or even on the anterior surface. By stretching the parts, or by hooking down the mucous membrane with the finger, or by employing the speculum, the ulcer or fissure may be easily seen, as then they are no longer doubled on themselves. In our examination it were well to use chloroform, both to annul the pain and obtain relaxation of the sphincter. The finger unaided can usually detect an ulcer by the inequality in the mucous membrane, and the peculiar velvety feeling of the sore, together with the pain which contact with the spot gives rise to, and the stain of blood usually left on the finger. In ulcer, blood is also frequently streaked over the stools. Spiced food, alcoholic drinks, coffee, &c., increase the discomfort.

The only error in diagnosis to which fissure or ulcer of the anus can give rise, is mistaking the irritation caused by them in neighbouring parts or organs for affections of these parts or organs themselves, and thus not referring them to their true cause.

C. **Fistula** in ano is a sinus leading from the gut to the surface. It is most frequent in men at or beyond middle life. It is preceded by the formation of an abscess in the neighbourhood of the bowel, and the pain of this abscess may be the first symptom observed. Sometimes the fistula becomes established very insidiously, and without almost any noticeable preliminary symptoms. Occasionally it is an accompaniment of tubercular disease of the lungs. There is usually a complete communication between the gut and the surface; but before this is established, there is only an external and no internal opening, and in this case the fistula is said to be incomplete. The existence of an internal and no external orifice has been observed in a few cases, but it is very rare.

The external opening may be removed from the anus to variable distances. It is frequently concealed by a small papillary projection of florid granulations, in the centre of which the opening is found. Sometimes it is a mere speck, lying in the folds of the skin, which radiate from the anus. The projection spoken of, when it exists, will serve as a guide to the external orifice, which at other times will be pointed out by the escape of fluid. There may be several external openings having one or more internal orifice; or there may be (rarely, however) several internal, and only one external opening. The internal opening, when it exists, lies close above the sphincter, within an inch of the anus. It can frequently be felt as an irregularity on the side of the bowel. It does not always lie on the same side of the bowel as the external orifice, and it is occasionally very difficult to find. In searching for it with a probe, much gentleness must be used; and the probe should be introduced before the finger is passed into the rectum, as the direction of the sinus may be materially changed by the distension of the gut by the finger. The passage from the external to the internal orifice is frequently very irregular and tortuous. If a probe cannot be passed, we may determine its connection with the gut by injecting a weak solution of iodine, and observing whether the fluid escapes by the anus, or stains the finger inserted into the bowel. The escape of fæces or worms by the external opening will show the existence of a communication with the bowel; while the passage of flatus, if in quantity and frequently, though not a positive proof, will make such a connection almost sure. The feculent smell of the pus which escapes does not, however, prove that such a communication exists. The speculum will sometimes enable us to examine the internal orifice by the eye.

Internal (blind) fistula makes itself apparent by the existence of pain and throbbing in the rectum, followed by intermitting discharge of pus with the motions, and frequently also between the evacuations. The pain is occasionally not referred to the anus at all, but to the loins, thighs, and even to the calves of the legs; and it is in these cases that a mistake is apt to be made as to the real nature of the affection we have to treat. Defecation is then often painful. There is hardness, occasionally discoloration, and often pain in the perineum on one side of the anus, and pressure causes pus to escape. The opening into the gut may sometimes be recognized by the finger or speculum.

Fistula in ano has been mistaken for urinary fistula; but the distinction is not difficult. The history of the case; an indurated feeling along the course of the sinus, leading towards the urethra or neck of the bladder; the exploration of the sinus by a probe; the co-existence in the one case of stricture; the character of the fluid which escapes, and its escape, in the case of the urethra, only when the bladder is evacuated; the sensation the patient experiences (frequently) when the urine passes by such an abnormal channel; the decreased flow of urine by the meatus, if it pass freely by the fistula—will all serve to differentiate these affections.

**APHONIA** (ἀ and φωνη, loss of voice).—This may be complete or incomplete, and may depend upon structural changes in the windpipe or mere functional causes. Acute or chronic inflammation, of common or specific origin, affecting the back of the throat and especially the larynx; a congested and relaxed state of the throat and windpipe, such as follows catarrh; the extension of morbid action from the tonsils, fauces, or pharynx; submucous effusions, swelling, ulceration, hypertrophy, and irregularities, caused by growths, loss of substance, &c.; wasting and induration of the rima glottidis or vocal cords (or paralysis of one or both), or interior of the larynx; disease of the trachea, congestion, softening or growths at the base of the brain affecting the roots of the laryngeal nerves; disease of the bones or the dura mater at the base of the skull; aneurismal or other tumours in the neck or thorax, compressing the windpipe or the recurrent nerves; blows paralyzing the larynx; fistulous openings leading into the windpipe; foreign bodies and growths in the air-passages; spasmodic affections; narcotic and other poisons, as lead, &c. &c. Alteration or suppression of the voice may be due to any of these causes, as well as to others which are purely functional, such as general nervous exhaustion, anæmia, local feebleness, as that which follows overstraining of the voice, or the frequent employment of it in an unnatural key. Aphonia occasionally follows violent mental emotion in persons in weak health or of impressive temperament, and it is a common symptom of hysteria depending on uterine derangement, and it may be apparently due to prolonged constipation.

The diagnosis is generally not difficult. The history of the case; the mode of invasion, progress, and continuance; the appearance, temperament, and moral condition of the patient; the presence or absence of disease (capable of producing it) in the brain, throat, or windpipe; the existence or not of growths, internal or external, to the air-passages, or of foreign bodies in the tube—these must all be looked to. In the examination of doubtful cases, where structural changes or growths are suspected, the laryngoscope will prove of the greatest use. Our opinion as to a purely nervous cause will be formed from the suddenness of the invasion, and its occasional as sudden disappearance, probably under excitement, or without any apparent cause; the absence of any discoverable local affection, there being no pain or cough or expectoration or dyspnœa; and by observing the temperament and state of health of the patient.

**ARTERITIS**, or inflammation of arteries, is an affection, the occurrence of which some pathologists have wholly denied, while others have attributed to it very many of those pathological changes which are met with in arteries. Though a rare affection, there can be little doubt that it occasionally presents itself, possibly arising from purely constitutional or internal causes (spontaneous), and certainly due in many instances to local injury (traumatic) acting directly upon the coats of the vessel. Such injury may be sustained during the operation of ligaturing an artery, or in the progress of wounds, or even as a result of violent and sudden changes of temperature. It is well known how arteries resist the invasion of inflammation pre-existing in neighbouring parts, so that they may remain unharmed even though lying bare within the cavity of an abscess. Yet when they are directly injured, the effect may be very different. They may then become inflamed throughout a smaller or greater extent. The arteries of the lower extremity are more liable to inflammation than those of the upper. The morbid action may be very limited or pass over the whole extent of the vessel, or even implicate the whole arterial system. It may be acute, subacute, or chronic in its intensity and progress.

Acute arteritis manifests itself frequently after a rigor by pain along the course of the affected vessel. This pain is increased by pressure and motion, and especially by the flexion of the limb. The pulsations of the vessel appear at first augmented, both to the patient and the surgeon. The patient is conscious of an increased action in the vessel and of a fulness in the part. If the vessel is superficial there may be a certain amount of swelling and redness along its course. The inflammation tends to spread in the course of the circulation, although occasionally it is otherwise, as after the ligature of a vessel, when it passes to the proximal side only. In time a firm reddish coagulum forms in the vessel and closes its canal, and in this way the movement of the blood becomes arrested, pulsation ceases, and a cord-like hardness is found along the artery, while the circulation in the parts supplied by the vessel gives evidence of derangement, and from this the most disastrous results may follow. The part, from being reduced in temperature, œdematous, and vesicated, becomes the seat of much uneasiness. There is a feeling of engorgement, tingling, and formication, and occasionally there is violent shooting pain. By degrees abscesses form, and sensation and motion become abolished, while gangrene seizes on the part whose blood supply has thus been cut off. If, however, by treatment the disease be arrested, then of course such dire consequences as those enumerated may one and all be avoided. When, however, the vessel has become slowly impervious, it does not necessarily follow that those destructive results which have been mentioned become developed, as the collateral circulation may redeem the vitality of the member, and in time all may again go well.

Constitutional symptoms in the form of fever, at first of the sthenic, and ultimately possibly of the typhoid type, will probably attend the affection, if the vessel implicated be a large one, and especially if it be one of the great arteries of the trunk.

The distinction between arteritis and phlebitis, or lymphatitis, or even of general inflammation of the part, is frequently very difficult or almost impossible, that is, when it is not a vessel of considerable size which is the seat of the morbid action, in which case the pre-existence of an adequate cause, the occurrence of pain along the vessel, the state of pulsation in it, and the condition of the circulation in the parts beyond, will sufficiently point out the true nature of the disease. Phlegmon can hardly be mistaken for it, as there is a circumscribed swelling, pain of a peculiar character, and no signs of obstruction in the circulation beyond, as in arteritis.

When the affection is chronic and limited, and the vessel affected deeply placed, the pain occasioned is apt to be mistaken for that of rheumatism. It is in persons of a depraved habit of body, especially in those who are intemperate or who have been subject to gout or rheumatism, and who are beyond middle life, that spontaneous arteritis has been usually seen.

Frequently the etiology of spontaneous arteritis, however, is quite undiscoverable. In those cases in which the disease is due to an internal cause, the constitutional symptoms will probably be very severe, and the affection will most likely prove fatal.

**ARTHRITIS**, *i.e.* inflammation of the tissues composing an articulation. — It may be acute, sub-acute, or chronic, spontaneous or traumatic. It may attack many joints, and be rheumatic in its character, or it may be confined to one or two joints, and have no dependence on the rheumatic diathesis. Arthritis occasionally follows the passage of instruments along the urethra, and may occur in the course of gonorrhœa; it may attend pyæmia, especially when that disease arises after childbirth; it may depend apparently on mere exposure to cold and damp, and accompany or follow any lowering ailment, such as fever. It may occur at any age, but is most frequently seen in adults. In whatever tissue entering into the formation of a joint the morbid action commences, it will most probably ultimately come to affect them all in various degrees of severity if it is not arrested or removed.

A. *Acute Arthritis* shows itself by the following signs:— It often sets in by chills and a feeling of discomfort. *Pain* becomes developed in the joint. This is severe, and usually of a tensive burning and wearing-out character, and is worst at night. Occasionally it is throbbing and totally destructive of rest. The pain is increased by all motion, however slight, so that all anticipation of communicated movements gives rise to great fear, and thus an apparently uncomfortable posture will be long endured rather than risk any renewed motion. In the earlier stages, the patient instinctively assumes such a posture as will most relax all the ligaments of the joint, and least press the articulating surfaces together. Once he discovers this posture, he will be most averse to change it. He seeks to fix the joint, and so contracts the muscles as to effect this as much as possible. After effusion has taken place, a forced position is given to the articulation by the fluid. Heat and swelling also mark the malady; and if the joint is superficial, redness, too, may be evident, though it is seldom very marked, and is frequently altogether absent. When effusion takes place, the distortion of the joint will be apparent, and that the more superficial and less tightly bound the articulation is. It will be at those parts of the joint where the tissues are least firm and resistant that the deformity will be most seen. This will be made evident by comparing corresponding joints. The effusion is sometimes mainly within the articulation, sometimes chiefly in the tissues around; and the sensation communicated to the hand will vary accordingly. If the fluid is serous and abundant, we will have fluctuation apparent; but if plastic, then a more or less elastic character will be communicated by it; and in the event of there being an abundant extra-articular plastic effusion, the fluctuation of serous fluid within the joint may be obscured. The parts around the joint, and it may be the whole limb, are frequently swelled and œdematous, and the lymphatic vessels may become painful and enlarged. From the joint the inflammation occasionally stretches along the sheaths of the tendons. Abscesses may form around the articulation, and the whole become disorganized. Some of the tissues being broken down are absorbed, and the bones, when denuded of their cartilage, come to grate on one another during motion. The articulation thus gets loose, the bones lose their connection, and thus the mechanism of the joint is destroyed. Painful spasms, amounting to violent cramp, or *subsultus tendinum*, prevents rest; and fever, at first of an inflammatory, and ultimately of an irritative or hectic type, wears out the sufferer.

It may be here observed that, in examining joints in order to determine the presence of inflammation in any doubtful case, we should apply pressure to those parts of the articulation which are most superficial, and that these are as follows: *In the ankle* joint, in front and a little above the malleoli; *in the knee*, on either side of the patellar ligament; *in the hip* joint, close behind the trochanter, the fingers, in the shape of a cone, being pressed deeply just behind the projection of the process; *in the elbow*, in front, just over the head of the radius; and *in the shoulder*, on the anterior aspect of the joint.

The affections with which arthritis may be confounded are:

(1) *Suppuration in the neighbourhood of, but external to, a joint.* In this case the superficial position of the fluctuation; the evident limitation of the swelling to one side of the joint, and its absence from other parts, where it would also appear if there was effusion within the cavity; the extension of the swelling over some bony projection near the joint; the absence of all signs of disorganization in the articulation, such as grating, preternatural looseness, &c., and the embarrassment of the movements, being nothing more than the mechanical influence of the swelling would account for; and lastly, the absence of severe constitutional disturbance, and of startings in the limb, will enable us to draw the distinction.

(2) A rare form of *syphilitic periostitis* of the articular ends of bones has been described by Ricord, which might be mistaken for acute arthritis; but it is much less severe; the pain is not so great, nor influenced in the same way by motion; there is no effusion into the joint nor so much swelling. Further, in the syphilitic affection we would find in the skin, or mucous membranes, or glands, or bones, other indications of the disease.

B. *Chronic Rheumatic Arthritis* is an affection which occurs most frequently in men about fifty years of age who are poor and much exposed to cold and damp, or who are rich, luxurious, and indolent. It is frequently clearly connected with a constitutional rheumatic or gouty diathesis, and is sometimes apparently excited by injury. Of all the articulations, the hip is that which is most obnoxious to this affection; but it may have its seat in any of the joints, even those of the fingers, toes, and spine. It is said that males are more liable to be affected in the larger, and females in the smaller joints. More than one articulation may be affected, and the attacks may be distinctly remittent.

The symptoms by which chronic rheumatic arthritis is characterized are (1) Pain, (2) Deformity, (3) Embarrassed or destroyed function, (4) Crepitation.

(1) *Pain*, at first slight, gradually augments, till after a time it is very severe, especially at night (not always, however), rendering the movements of the joint very difficult or

even impossible. The pain is usually manifestly augmented by cold and damp, and by derangement of the digestive and biliary functions. The pain frequently shoots along the nerve for some way from the joint; thus, in the hip it comes down the front of the thigh.

(2) *Deformity*, at first due to synovial effusion into the joint and the bursæ in connection with it, is referable afterwards to changes which take place in the form of the articulating surfaces, and in the relationship between them, and also to the depositions which occur in the neighbourhood of the joint.

(3) *The movements of the joint become gradually lost.* At first mere stiffness in the use of the articulation is observed. Afterwards more or less complete fixture takes place from changes in the head of the bone and its cavity, adventitious growths near the joint or displacement of the bones.

(4) *Crepitation*, due to the articulating bones being denuded of cartilage, and the roughened condition into which they fall. This crepitation is most apparent after a period of rest; and is evident both to patient and surgeon, being sometimes more noticeable by the one than the other. When the *hip* is affected, the limb is generally held straight out by the patient when he sits, and he evidently fears to stoop or make any movement. The limb becomes changed in appearance. From the oblique position assumed by the pelvis, there is at first a greater apparent shortening than really exists; but after the articulation becomes disorganized, there is a *real* shortening, by which the heel is drawn up. The hip becomes flattened; the pelvis distorted; the trochanter projects; and the muscles of the thigh (not of the leg) get atrophied. The neck of the bone alters its relationship to the shaft; the acetabulum, too, undergoes certain pathological changes, and the ligaments become relaxed or absorbed. Hence there is lameness, with circumduction of the thigh on the pelvis, if the patient can walk at all. Exostotic formations near the joint increase the deformity, and the knee and foot are everted.

In the *knee* the disease in time causes semi- or entire dislocation outwards of the patella, and a falling inwards of the articulation, together with eversion of the foot. If there be a deposit of new bone, such anormality can be felt.

In the *shoulder* the wasting of the muscles, especially of the deltoid, is marked; the humerus is occasionally displaced forwards and upwards; the joint becomes more or less rigid; its movements (if any remain) are attended with crepitation; and osseous deposits can be felt.

In the *jaw* there is deformity of the face, confined to one side, or causing protrusion of the whole maxilla, according as the affection implicates one or both sides. There is also stiffness or immobility, creaking, and pain. The articular end of the jawbone becomes enlarged, and the glenoid cavity gets changed in its shape, and deprived of its cartilage.

Chronic rheumatic arthritis is characterized by its slow establishment; its great obstinacy; the age at which it usually appears; the class of persons whom it affects; the articulations most commonly seized; and the deformity, pain, loss of function, and crepitation it gives rise to. It may, however, be confounded with various affections.

(*a*) *Rheumatism.*—But there is no lithic acid deposit in the urine, and the history and progress of the case (especially in its early stages) are different. There is not the same protracted loss of function, nor is there the same crepitation in rheumatism.

(*b*) *Sciatica.*—The pain is not so acute in chronic rheumatic arthritis as in sciatica;. and it is differently placed, being chiefly in front of the thigh; and there is besides the deformity of the hip and limb, and the eversion of the foot, which do not exist in sciatica.

(*c*) *Fracture or dislocation* (especially of the femur), when the rheumatic affection has appeared after injury. The history before and after the accident; the existence before the fall or the blow (though perhaps not to the same degree) of symptoms which are common to both affections, as shortening, eversion, crepitation, and loss of function. In many cases the recognition will be very difficult, or even impossible.

**ASCITES** (ἀσκος, an enlarged abdomen).—A collection of serum in the abdominal cavity.

Acute or chronic.—The former is an inflammatory affection; and the latter occurs consecutively, and results from some obstruction to the portal circulation, or from loss of blood. The cause may lie in the peritoneum, heart, liver, spleen, or kidneys. It is recognized and distinguished from other affections chiefly by attention to the character of three signs—namely (1) the enlargement, (2) the fluctuation, and (3) the resonance.

(1) The *enlargement* is uniform, equal on both sides of the middle line. It takes place slowly and progressively, beginning below, and gradually filling up. This and the other characters to be immediately mentioned depend on the fluid being free in the cavity of the peritoneum, and so moving equally in all directions. It will, from the influence of gravity, always seek the most dependent position. The abdomen is prominent, tense, often shining. The superficial veins on its surface, and occasionally those also on the chest, are prominent. The umbilicus frequently projects.

In the recumbent position the abdomen gets somewhat flattened (but not if greatly distended), the fluid falling down into either flank.

(2) *Fluctuation.*—This is very apparent, either by tapping gently on the surface, or drawing the nail rapidly along it. The position of the fluctuation will change with the posture of the patient; it always seeks the dependent position, and assumes a level line at its upper border.

(3) Percussion is dull where the fluid lies, and clear where the intestine comes near the surface. Thus in the recumbent posture we will have sonority on percussion on the most elevated parts of the abdomen, and dulness in the flanks, unless the distension is so great that the mesentery is too short to allow of the intestines reaching the wall, or unless the bowels are so bound down by adhesion that they cannot float up, or that the fluid is confined by adhesions. If, again, the patient is made to lean forward or lie on the side, the relative position of the clear and dull portions of the cavity will be changed. When there is but little fluid, we can, by elevating the pelvis and making the patient lie on one side, cause the whole fluid to collect into one place, so as to render its presence apparent there, if adhesions do not hinder its migration.

Symptoms of pressure and a sensation of weight and dragging, and a tight feeling, especially after food; dyspnœa, when the head is low from the diaphragm not descending; palpitations; sometimes hæmoptysis; interference with the digestive and urinary organs (indigestion, flatulence, vomiting, constipation, diminished flow of urine)—also result from ascitis. The skin gets dry, and the thirst is often considerable. Occasionally, there is fever, hæmorrhage, and varicosity of the veins of the lower limbs. The legs become anasarcous, from the pressure on the veins; and the patient walks wide, in consequence of such enlargement of the lower limbs—the spine being bent backwards, and the gait waddling from the weight in front.

Ascites, being a consecutive affection in the vast majority of cases, and dependent, as was already said, on derangement of some important organ, such as the heart, liver (especially thickening and contraction of Glisson's capsule), spleen, or kidneys, tumours pressing on the portal vessels, disease (cancerous or tubercular) of the peritoneum or mesentery, or glands of the abdomen, &c.—is preceded by symptoms referable to the primary complaint, and it is generally accompanied by marked depression of the general health; emaciation (especially of the face and upper parts of the body, except in kidney disease), and debility. The pressure and weight of the accumulation also embarrass the functions of the abdominal, pelvic, and thoracic organs.

Ascites has been confounded with (*a*) Ovarian dropsy; (*b*) Tympanitis; (*c*) Obesity; (*d*) Solid tumours in the abdomen; (*e*) Encysted dropsy of the abdominal walls; (*f*) Dropsy of the uterus; (*g*) Pregnancy; (*h*) Distended bladder; (*i*) Cysts of the liver, kidney, Fallopian tubes, &c.; (*k*) Hydatid cysts; (*l*) Greatly distended stomach.

(*a*) *Ovarian dropsy.*—In both the gait is peculiar; in both the abdomen is distended. There is fluctuation, dulness on percussion, and the symptoms due to weight and pressure in both. But

(1) The enlargement is uniform and symmetrical in ascites—it is equal on both sides. In ovarian disease it is more upon one side than upon the other, unless when in an advanced stage, and the abdomen is much distended. It is more pro-

minent and globular, too, in ovarian disease when advanced, than it is in ascites. When the patient is lying, the breadthening out seen in ascites, is not observed in ovarian disease.

(2) Fluctuation is very apparent in ascites; but little so in ovarian disease, except when one large cyst fills the abdomen.

If there be many cysts, the fluctuation in each will not be observed beyond the extent of its boundaries, so that we will have several centres of obscure fluctuation in such cases.

(3) Percussion is clear at the highest part of the abdomen in ascites, whatever posture the patient may be in, and when recumbent it is clear in front, from the intestines floating up (except in such exceptional cases as when the distension is so great as to prevent the bowels reaching the surface, or when they are abnormally bound down). In ovarian disease, on the contrary, the percussion is dull in front, except at the umbilicus, because of the cyst being in close apposition to the abdominal wall, and it is clear perhaps, if at all, in the flanks. The exception to this is very rare, and occurs when air has gained admission into the cyst, in consequence of adhesion of the cyst to, and perforation into, a portion of the gut; or when the cyst remains attached to the abdominal wall after being tapped, and the air so gaining admission. Further, in the erect position there will be a distinct level reached by the fluid in ascites, the line of which is even; but in ovarian disease coils of intestine may, by careful examination, be found to dip at some points below the level of the fluid.

Again, the dulness will shift its position in ascites, according to the posture of the patient, but it remains fixed in ovarian disease.

By palpation, too, the oval outline and irregular surface of ovarian tumours may be made out, and the freedom of the abdominal wall from their surface often distinguished. There is a feeling as if the fluid was not in such close apposition with the hand as we observe it to be in ascites.

The "os uteri" is in its normal position in ascites, but frequently drawn up and displaced in ovarian disease. By vaginal examination, too, we will likely be able to feel the ovarian cyst. If we obtain the early history of the maladies we will find that the ovarian tumour has begun in one iliac fossa, and gradually invaded the abdomen, while in the case of ascites it has gradually come up from the pelvis, filling the cavity symmetrically. Ovarian disease is slower in its progress than ascites; and unless it be very acute, or long present, or far advanced, or has been repeatedly tapped, or be accompanied by much pain, or severe indigestion, or be connected with a cancerous affection, it little, if at all, affects the general health; while in ascites the health is gravely compromised, and a pale and unhealthy look, together with emaciation, generally proclaims the lowered condition of the patient. Anasarca of the lower limbs (so common in ascites) does not usually appear in ovarian disease till a late stage of the complaint, and when the ovarian tumour has assumed a great size, and it *follows*, and does not precede, the abdominal enlargement.

Lastly, in ovarian disease, there will not be any account of such previous affections of internal organs as usually precede ascites.

(*b*) *Tympanitis.*—The distinctive symptom here is the absence of fluctuation and the clear sound on percussion all over the abdomen, and also the history of the case.

"Phantom tumours," as they are termed, of the abdomen, are tympanitic in their nature, and have been confounded with both ascites and ovarian cysts. The imprisoned air being occasionally combined with fluid or hardened fæces increases the deception, as indistinct fluctuation or a hard mass may be present. They occur in hysterical females for the most part, who suffer from uterine derangement or spinal irritation, but may also be met with in males. They may remain unchanged for weeks and suddenly disappear. Their nature is recognized by observing the disposition of the patient—the inconstant character of the apparent tumour—the history connected with them, especially their rapid formation—their occasionally going during manipulation—the effects of percussion, and above all their subsidence under chloroform.

(*c*) *Obesity* cannot, by attention, be mistaken for ascites. The absence of fluctuation, and the dulness all over on superficial percussion, and semi-clearness on deep percussion, and the history and general appearance of the patient will guide us.

(*d*) *Solid tumours.*—The outline of the solid tumour can in general be felt—their history is different, and they are dull on percussion at all parts, unless, which is rare, some coils of intestine get in front, when a limited amount of clearness may be found, which will probably change its position from day to day.

(*e*) *Encysted dropsy of the abdominal walls* is a rare affection. There are no previous symptoms of visceral affection. It begins at a circumscribed part of the wall, generally at its centre; it is not often observed in a dependent position, and spreads gradually from the point where it begins till it invades the whole surface of the abdomen. It frequently spreads from above downwards, *i.e.* in a direction opposite to that which occurs in ascites. There is fluctuation and dulness on percussion, but they are superficial and do not change by posture. Firm and deep pressure and percussion evidence the presence of the intestines, which are not displaced.

(*f*) *Dropsy of the uterus* is very rare. The enlargement is confined to the lower part of the body. It lies low down, and the fluctuation is very obscure and only observed above the pubes. The outline of the uterus may be distinguished, and by vaginal examination its implication may be discovered. The history and progress of the case are peculiar. It begins in the centre and increases very slowly, while the effects of pressure on the rectum, bladder, and veins are very early observed. Pain in the groins and inner surface of the thighs is a marked symptom proceeding from the same cause. The catamenia, too, are entirely arrested.

(*g*) *Pregnancy.*—This may be combined with ascites. The history, if obtainable, will distinguish. The question can only arise when the tumour appears during certain periods of life, and has continued a certain time. The concomitant symptoms in the one case of previous visceral disease, in the other of the functional disturbances which are so well known. In pregnancy the tumour is pyriform and in the centre line, and rises out of the pelvis: it is solid, non-fluctuant, and dull on percussion.

The general health is good, the breasts are enlarged, and the nipples have the areola around them. There is also the state of the os, on vaginal examination. Ballottement, and after a time the placental souffle, are present, together with the fœtal movements and the double heart-sound of the fœtus, all of which will point out the true condition. A thin-walled uterus, distended with liquor amnii, might possibly be mistaken for ascites, but the distinction is to be made by attention to the general features of the case and the points above alluded to.

(*h*) *Distended bladder*.—This has been repeatedly mistaken for ascites, and is said to have been so by no less an authority than John Hunter. But here the fluctuation and dulness on percussion of the tumour, which is in the middle line and does not extend far into the flanks, will direct us. The history of the case, too, which tells of complete retention or constant dribbling, and the fluctuation being deeper down than in ascites, and not being so evident, and the relationship of the dulness not being changed by posture. The outline of the tumour is shown to be pyriform by percussion; the desire to micturate is frequently complained of when pressure is applied; and, lastly, the effects of catheterisation.

(*i*) *Cystic tumours* of the liver or kidney begin in the region of these organs, and are circumscribed. They have a different history, and very seldom come to distend the whole cavity of the abdomen.

(*k*) *Hydatids*.—Here the history of the case and the position of the tumour (its being generally formed in connection with the liver, and projecting mainly in the right hypochondrium), together with its slow progress, and perhaps its undergoing sudden subsidence, accompanied by constitutional and local disturbance, to reappear again ; the elastic, round, firm, smooth, or irregular outline on palpation; the slight degree of fluctuation, and what there is being circumscribed; rarely but occasionally, the indistinct movement of the hydatids being felt, and the presence of dulness, which does not change its position with the posture.

(*l*) *From distended stomach* the distinction has very rarely to be made. Cases of enormous dissension have been, however, met with, in which, from the immense amount of solid and fluid contents, great enlargement of the abdomen existed, and the percussion was dull and fluctuation apparent. But in such cases, the history will be different from that of ascites; the part of the abdomen from which the swelling begins and extends will be different; the shape assumed by the belly is not the same; the enlargement varies in degree at different periods of the day; the general health does not suffer; there is a clear sound got on percussion low down, below the limits of the stomach; and if any doubt still remains, an emetic will remove the enlargement in cases of gastric distension.

Lastly, to diagnose the particular cause of the ascites is always desirable, and is frequently quite attainable. The history and progress of the affection are, of course, here of the first moment. When it sets in suddenly, is rapid in its progress, and has followed exposure, it will probably result from inflammation of the peritoneum and excessive serous exhalation.

If it occurs rapidly in young persons who are in apparent health, or who present evidence of the scrofulous diathesis, it will probably be due to miliary tubercles in the peritoneum. If preceded by abdominal pain, constitutional disturbance, emaciation, and hardness of the abdomen, then probably chronic peritonitis will be the cause. If it is preceded by anasarcous enlargement of the limbs, we must look to the heart. If the face is puffy and waxy, and the upper part of the body œdematous, then the kidneys are probably at fault.

If it originate in the abdominal cavity, then we must examine by palpation and percussion the liver and spleen; and if there be no abdominal disease discoverable, probably contraction of the liver and obstruction thereby, or by the pressure of tumours, of the portal circulation, will be the cause.

If the patient is old, cachectic, and has got rapidly emaciated, and especially if he is a member of a cancerous family, and there be a deposit of uric acid in the urine and still no appearance of gout, and if no other cause can be discovered for the affection, it is most likely that a small cancerous tumour may exist in or about the liver, though there can be no certainty on the matter unless such a tumour can be felt.

**AXILLA**, TUMOURS OF.—These are very numerous and of very many kinds. They may have originated in this situation, or arising in other parts, appear in the axillary space.

Tumours here situated may be of one or other of the following kinds:—

(1) *Bony.* (*a*) The head of the humerus dislocated into axilla. In this case the history of the accident, the round head of the bone rolling with the rotation of the shaft, lying high up in the space, together with the other signs of dislocation—the absence of the head of the bone from the socket, the projection of the acromion, the loss of function, &c., will enable us to recognize the nature of the tumour.

(*b*) The head of the humerus detached from the shaft by fracture occurring at the neck of the bone. Then the presence of the peculiar round, hard body, and the other signs of the injury described under fracture of the neck of the bone, will be apparent.

(*c*) Fracture, without displacement of the head of the bone from the cavity, but the projection of the upper end of the lower fragment into the axilla. (See Fracture of the Surgical Neck of the Humerus.)

(2) *Lymphatic glands,*

(*a*) When inflamed, exhibit the signs of local inflammation (and perhaps constitutional fever). There will be the presence of hard, painful, movable masses, at first distinct, but ultimately coalescing, fusing, and becoming soft and fluctuant. These will be found lying in the centre of the space, or along the thoracic wall. They arise from some irritation in the arm or hand, or back or shoulder, or scapula or front of the chest.

(*b*) Chronically enlarged glands subsequent to acute inflammation. Their position, as in (*a*), their firm consistence, their being painless and movable, their progress slow or stationary, the skin being unaffected, and the general health unimpaired.

Lastly, the employment of the patient will perhaps explain their presence.

(*c*) Tubercular infiltration. A slowly-increasing, painless, frequently lobed mass, or several distinct enlargements, at first often in a chain, firm or soft to the touch, and easily broken up, attaining frequently a very great size, and then burrowing up under the clavicle into the neck; occurring in persons of weak habit of body, who generally present elsewhere signs of the scrofulous habit.

(*d*) Cancerous affection. This is generally consecutive to malignant disease of the mamma, for it is very rare that primary cancer appears in the axilla. This tumour shows itself as a hard, irregular, heavy mass, or as a soft, bossy tumour, rapidly growing after the occurrence of a similar tumour in the mamma. There will be evidence of cancerous cachexia, and the glands, both above and below the clavicle, and also in the neck, if the tumour is advanced, will be affected. Such a tumour is often united by a hard cord with the mammary growth. It is usually solitary and tolerably firmly fixed. It is attended by lancinating pain, and ultimately implicates the skin.

(3) *Abscess.*—This may result from (*a*) suppuration of the lymphatic glands or cellular tissue, and in that case we will have fluctuation, pointing, &c., following on the symptoms of phlegmon.

(*b*) Disease of the ribs. In this case there will have been evidence of such an affection for some time previous to the appearance of the pus, and also the absence of the usual signs of inflammation of the cellular tissue in the axillary space itself.

(*c*) Pus coming from a distance.

(α) From the cervical vertebræ fusing down along the brachial plexus.

(β) From the posterior triangle of the neck, from above or below the clavicle.

(γ) From beneath the scapula, or from its upper or posterior borders.

(δ) From the shoulder joint.

(ε) From within the chest (empyema).

In any of these cases there will be evidence of disease at the part where the abscess originated, the fluctuation will appear at once without preceding phlegmon, and by alternate pressure on the upper and lower part of the collection (if the upper, too, be accessible, or if not, then on the parts lying over the original site of the affection), the pus may be made to pass from the one part to the other. Thus, in suppuration above the clavicle finding its way down into the axilla, this migration may be made evident, although, in such cases, the pus can only be pressed very slowly upwards from the more dependent position.

When pressure is applied over the part from which the pus proceeds, the swelling in the axilla will be manifestly enlarged. If the scapula is raised by fluid lying below it, then when it is pressed towards the ribs, the matter will be forced into the axillary pouch. If the shoulder-joint be the source of the pus, there will be signs of disease in the articulation, and the pus may be made to escape into the axilla by moving the joint. When empyema points in the axilla, the stethoscope and percussion, and the other symptoms of the primary disease, will reveal the state of affairs in the chest. Cough increases and renders more tense the axillary tumour; and as the pus can be slowly pressed back into the chest, the symptoms of embarrassment and of dulness on percussion will be thereby aggravated.

(4) Tumours connected with the blood-vessels. (*a*) Aneurism. It is not alone aneurismal tumours of the vessels existing in the space itself which may be met with in the axilla, but aneurism of the brachial artery may extend up into it; aneurism of the subclavian may dip down so as to invade it; and aneurism of the aorta even may extend so as partially to occupy it. In such cases we will have abundant evidence of the existence of the aneurism at the part from which it springs, and there will also be those signs indicative of the character of the swelling enumerated under the head ANEURISM. The distinction between such a tumour and an abscess will be found at p. 62.

(*b*) Arterio-venous aneurism is recognized by the characters laid down at p. 84.

(*c*) Bloody tumours. It has been occasionally (but rarely) seen that after the difficult reduction of a dislocated humerus, a bloody tumour has suddenly appeared in the axilla, due to the rupture of some of the smaller blood-vessels. Its rapid formation in these circumstances, its peculiar feel, the subsequent appearance of ecchymosis, and the spontaneous disappearance of the swelling, will distinguish this tumour.

(5) Hernia of the lung, occurring after a wound in the axilla, penetrating the chest, or arising at a later date from erosion of the ribs, is discussed under the subject CHEST.

(6) Traumatic emphysema is an occasional but rare cause of swelling in the axilla. The air may either obtain access into the space through a wound from without, or it may escape from the lung. The skin is unchanged over such a swelling—it is rapidly produced—is diffused and crackles on being handled—and percussion gives a clear note. It is not notably affected by cough.

All the more solid tumours may, when they attain some size, produce a train of symptoms which are referable to the mechanical pressure which they exercise—embarrassment in the motions of the arm, pain, œdema, &c. Cancerous and tubercular tumours usually produce these effects both rapidly and severely.

**BALLS**, MUSKET, IN THE TISSUES.—A musket ball, after penetrating the body, may become so inclosed as to give rise to no annoyance whatever. It may become encysted in the soft parts, and even enclosed in bone, and fail to make its presence observed. This, however, is the exception. Usually a ball acts like any other foreign body, by preventing the wound of entrance from closing, and causing it to become fistulous.

In order to detect the presence of a ball it is most important to examine the part early before inflammatory swelling has set in. After that time an examination is much more difficult for the surgeon, and infinitely more painful to the patient. The patient, too, is more courageous at first, and stands the examination better than when he has tasted something of the suffering. After gaining all information from the patient, as to the position he and his assailant respectively occupied at the moment when he was wounded, we should put him under chloroform, in order to relax the tissues, and so avoid all obstacles which may be produced by voluntary movements and contractions.

To diagnose the presence and position of a ball is sometimes very difficult, from the peculiar passage it may pursue through the tissues—its liability to be deflected by bones and tendinous expansions—the great distance it may pass from its point of entrance—and the way in which it may be concealed by the various structures.

The signs which would lead us to suppose a ball remained embedded in the tissues are:—

(1) The *wound remaining open*, painful, and discharging thin gleety matter. This will generally indicate the presence of some foreign body in the part.

(2) *Uneasiness* in the part which the ball, from its direction of entrance, may have reached. This uneasiness may alone be observed at certain times, in certain postures, or during certain movements. If a nerve is pressed on, then numbness or pain in the main trunk or some of its branches will afford us a useful guide to the position of the intruder.

(3) *Probing.*—If the ball is superficially placed, the little finger is the best probe. It not only allows us to detect the ball, but also to recognize the obstacles which may exist to its removal, and the relative position it occupies to the different tissues among which it lies. If the ball lies deeper a metallic probe will produce a ring when it comes in contact with the ball, or the sensation (much less reliable) it communicates to the hand will inform us of the presence of a metallic body.

The probe suggested by Nelaton, and employed in Garibaldi's case, may again prove of similar use. It has a small cup-shaped glazed extremity, about the size of a pea, on which a stain from the lead is left when it is impinged against the ball and twisted. Screw-pointed probes, to enter and remove part of the metal, should never be used, as they are dangerous, and for iron balls they are useless; but by means of a pair of dressing forceps, made to grasp the body, and then twisted, a small piece of the surface of a lead ball may be extracted. The electric probe of Favre has not yet been sufficiently perfected to be of much service, although it promises, when simplified and rendered more complete, to be of considerable use in doubtful cases. This probe is constructed on a recognition of the different conducting power for electricity of a metal and the tissues of the body. When a ball is interposed in the circuit of a feeble electric current the needle is strongly deflected so soon as the circuit is completed, a circumstance which does not occur when dealing merely with the tissues of the body. In its present form Favre's probe is too delicate and intricate for ordinary use.

In exploring a wound for a ball, the patient should be placed, as regards the surgeon, in the same relative position he occupied to his assailant, if that can be determined—the same attitude should be assumed and the same muscles put in action, as far as possible. The whole anatomical relationship of the part should be considered, and the deflecting influence of the different tissues borne in mind. The correspondence or the reverse of relationship between the two wounds existing in a limb teaches us little unless the wounds have clearly the characters of those of entrance and exit. (*See article* GUNSHOT WOUNDS.)

The two wounds may have given entrance to separate balls, or the ball may have been deflected and escaped in a direction so different from what we would expect as to mislead us; or the ball may have only penetrated a short way and dropped out of itself; or lastly, if a cul-de-sac of the clothes was carried in, the ball may have been withdrawn along with the pouch of cloth. All these circumstances must be borne in mind in our examination, to determine the presence of a ball in the tissues of the body.

Finally, interference with the peculiar functions of the part where the ball is supposed to lodge may contribute to our knowledge of its site, and in obscure cases the acupuncture needle may be used to detect its presence.

**BLADDER.**—(1) CANCER of this organ may originate in the viscus itself, or extend to it from neighbouring parts. The first affection is only referred to here. Any form of cancer may be met with in the bladder; but most generally it is of the encephaloid species, and this often develops itself very insidiously. Its early, and occasionally even its leading accompanying symptoms, may be referred to the digestive organs, as it may cause at first only irritation of the stomach and bowels, vomiting, constipation, &c. Hæmaturia is most frequently the first symptom referable to the bladder itself, and it continues usually a marked one during the whole progress of the case. It frequently sets in suddenly and violently; the blood being pure, and coming towards the end, or after the conclusion of the act of micturition. Pain of a dull, sometimes intermitting character, occasionally lancinating and burning, is felt in the back, loins, pelvis, hips, anus, hypogastrium, thighs, testicles, and more rarely in the penis. The desire to micturate increases in frequency, and is often accompanied by much straining and spasm. The bladder is difficult to empty, and the urine is passed in small quantities. Sometimes there is complete retention; at other times only a temporary stoppage occurs. There is great pain after the last drops are expelled. There may be a desire to stool also at the same time. When the bladder is pressed upon above the pubes or per anum, the pain experienced is usually augmented, and occasionally an elastic enlarged tumour may be detected. The sound passes most frequently with facility; but if the mass lies near the orifice of the urethra, it may be difficult or impossible to introduce the instrument. The passage of the sound or catheter gives much pain usually in any case, and this is aggravated on its being withdrawn. A rough sensation or a soft velvety feeling may be communicated to the hand at the same time. The instrument may detect a soft or hard mass within the bladder; and as we withdraw the instrument, it may be followed by the discharge of detached morsels, and generally by pure blood. The urine is more or less charged with blood. Sometimes, though rarely, there is no hæmaturia up to a very late date, and no indication whatever to draw attention to the bladder. The symptoms may be wholly those of intestinal obstruction (from mechanical pressure) and excessive gastric irritation. Such cases, however, are very rare. Occasionally pus and the treble phosphates occur in the urine, and then the secretion is highly offensive, and its decomposition rapidly takes place. We may find corpuscles mixed with the blood. Cells characteristic of malignant disease, or masses of such disease, may be found; but this is not always the case, nor is it always easy to detect such cells when they are present. The general health gives way, partly in consequence of cachexia (which, however, in this case, is seldom well marked), and chiefly from the pain, irritation, and hæmorrhage. There is often emaciation and much anxiety.

The passage of detritus is the only distinctive sign of cancer. Malignant disease may be associated with calculus; or a mass of cancer may be so incrusted with calcareous matter, as somewhat to resemble a stone, even on sounding; but then the instrument cannot be passed round or under the mass, from its being fixed and immovable. The history and progress of the case, the appearance of the patient, his age, the effects of sounding, the escape of blood and detritus—will distinguish the malady sufficiently from stone.

(2) INFLAMMATION.—"Cystitis," acute and chronic, may result from injury, extension of morbid action by continuity or contiguity of structure, cold, irritation, abuse of diuretics, cantharides, &c.

(*a*) *Acute.* Fever, preceded by rigors, and accompanied frequently by gastric disturbance, vomiting, &c., and much anxiety. The invasion is sudden. If the disease is not arrested the fever assumes the irritative or the typhoid type. There is pain above the pubes, and in the perineum, increased by pressure in the former region. A feeling of weight, too, exists in the perineum. There is pain in the penis of a burning character, and also in the anus, neck of bladder, loins, and down the thighs, and shooting round the pelvis. There is great irritability of the bladder, which at last comes to be unable to withstand the contact of even a small quantity of urine. Frequent micturition takes place, the act being accompanied by much pain and spasm, straining and tenesmus; the desire continuing even after the urine has been evacuated. Succeeding the incontinence may come retention and the accumulation of the urine, so as to elevate the bladder above the pubes, and pressure there applied will then be most painful. If it rise high, the patient lies low in the bed, and draws up the knees, so as to relax the abdominal walls.

The urine is at first highly acid, and tinged with blood, and afterwards comes to contain mucus, and perhaps pus, and to be neutral or alkaline. The contact of a sound or catheter gives much pain, and shreds of false membrane are occasionally expelled, and may even cause temporary retention by their impaction in the urethra.

(*b*) *Chronic catarrh* succeeds acute inflammation, or is caused by some foreign body, as stone in the bladder, or by the retention and decomposition of the urine, arising from some obstacle to its evacuation placed in the bladder itself or in the urethra. It may be due to cancer, or merely to cold. It is most observed in old men, and comes on slowly and insidiously. There is frequently very little pain for a long time, but it is liable to be aggravated by exposure to cold and damp, or fatigue, or excesses at table, or derangement of the digestive organs, and the abuse of stimulants. Occasionally it appears after the subsidence of a skin affection.

When this disease exists, the micturition is frequent, and attended with irritation and often actual pain. The bladder is incompletely evacuated, and pain is often most intense after the discharge of the last drops. There is much straining also. The urine, when it cools, deposits a more or less profuse sediment, of a transparent, thick, ropy, tenacious slime, which closely adheres to the vessel, and answers both microscopically and chemically to the characters of mucus. It remains at the bottom of the vessel, and does not mix by shaking with the urine. The supernatant liquor is not albuminous so long as the sediment is mere mucus. Pus comes to mix with the mucus, and may ultimately constitute the bulk of the deposit. It lies above the mucus in a whitish yellow, opaque layer, and mixes by shaking with the urine, giving to it a milky colour, unless, from the alkaline state of the urine, it becomes gelatinous. The pus can, by the microscope and chemical tests, be easily distinguished. The supernatant liquor is albuminous when pus is present. The treble phosphates and the phosphate of lime may also appear in streaks or masses: the former dissolves readily with nitric acid, and both can be recognized under the microscope. The urine, at first acid, becomes in time neutral, and then alkaline. It gets ammoniacal and very fœtid. The fever which accompanies this affection is hectic or typhoid, and ulceration or gangrene of the walls of the bladder may attend the disease.

There is no affection with which this disease can well be confounded.

(3) FUNGOUS TUMOUR OF THE BLADDER.—This is usually, though not always, malignant. It may be pedunculated or sessile. It may present itself as a small point (not larger than a pea), or a large mass of spongy, irregular, filamentous, tufty tissue. It is generally situated at the trigone, or the neck of the organ. According to Civiale, fungus is sometimes formed on the surface of other vesical tumours.

At its outset, and occasionally even for a considerable time afterwards, the symptoms of this affection may be very undefined, and its advance very insidious. Occasionally they become developed suddenly and in great intensity. It is more frequently met with in males than in females, and appears in some cases to be due to the irritation and inflammation set up by a foreign body in the bladder.

The symptoms of fungous tumour of the bladder are those which indicate the presence of a foreign body accompanied, or at least after a time attended, by hæmaturia and great pain (not, however, constant) in the pelvis, perineum, sacrum, and back, and occasionally also in the penis and thighs. The pain is commonly persistent in all conditions of the bladder as to fulness. The loss of blood is often very great indeed, and generally constitutes one of the most characteristic symptoms. There is painful and difficult micturition, and a frequent desire to stool, from the pressure on the rectum. If the tumour is situated near the vesical orifice of the urethra, it may cause retention. The urine frequently contains pus. A portion of the tumour being spontaneously expelled, or being removed by the sound or lithotrite, is the only certain sign of the nature of the growth that we have to treat. Coagulated blood or other debris may be, however, easily mistaken for such abnormal tissue if attention is not paid to its appearance. When a fungous tumour exists in the bladder, we find, on sounding, a soft spongy mass, which bleeds freely on contact with the instrument. The examination usually causes much pain. Little information can be got "per anum," as the tumour is too soft and resilient to be clearly distinguished. In the female, by introducing the finger into the vagina, and pressing up against the pubes, the mass within the bladder may be sometimes felt, and the pain will be greatly aggravated by such pressure.

(4) IRRITABILITY OF THE BLADDER, or morbid sensibility of the organ, leading to a frequent and urgent desire to evacuate it. This is usually merely a symptom of some other affection; as organic disease of the kidney, bladder, urethra, or prostate gland; but it may arise independently of these.

(*a*) It may arise from affections of the general system, as weakness and irritability of the nervous system, as in hysteria, spinal irritation, disease of the brain or spine, scrofula, venereal excesses, gout, and rheumatism. Even dyspepsia, dentition, fear and anxiety, and the irritation of the female system which attends the establishment of the menses, may cause it.

(*b*) Morbid states of the urine may be the exciting cause of the malady. These may depend on mal-assimilation, or the ingestion of crude aliments, producing a highly acid or alkaline state of the secretion; derangement of the kidneys, depending perhaps on the abuse of drugs, as cantharides, turpentine, copaiva, &c.; the presence of uric acid, lithates, oxalates, phosphatics, &c.

(*c*) Irritable conditions of the mucous lining of the bladder may produce it. This may result from present or antecedent inflammation (causing abscess, ulceration, hypertrophy, &c.); the existence of foreign bodies (tumours, calculus, &c.); the abuse of the catheter or sound; frequent over-distension; the application of violence, as after lithotomy or lithotrity; the effects of exposure to cold, and the abuse of alcoholic stimulants, &c.

(*d*) Irritation transmitted from neighbouring parts or organs may occasion irritability of the bladder. In calculi of the kidney we have occasionally symptoms exactly similar. Hardened fæces in the bowel; prolapsus of the rectum; piles, fissures, fistula, pruritus, and ulcer of the anus; worms; chronic dysentery; congestion of the uterus or ovary, displacements, ulceration and foreign bodies in the former organ, pregnancy, foreign bodies in the vagina; inflammation, ulceration, &c., of the prostate; inflammation or stricture of the urethra, phymosis, varicocele, vascular tumours at the orifice of the female urethra, &c.

The symptoms of irritability of the bladder are: Frequent desire to pass water, with difficulty in doing so, and often impossibility to control that desire. This, attended with more or less pain of a burning character at the neck of the bladder, extending along the urethra into the glans, or round the pelvis into the perineum, or even passing down the thighs, is a common and distressing symptom of the affection. There is occasionally so much spasm and straining attending the efforts at micturition, that the contents of the rectum are evacuated. The quantity of urine passed at each attempt is small, and the aggregate quantity passed in the twenty four hours is not usually greater, but is, on the contrary, frequently less, than normal.

The recognition of the complaint is easy enough; the difficulty is to discover its cause. In all cases the various sources from which it may arise must be borne in mind, and in obscure cases each must be separately investigated. In all cases the state of the digestive organs, the rectum, bladder, prostate gland, urethra, and urine (deposits, reaction, quantity, &c.), must be examined, and in the female the uterine organs and functions inquired into. The nature of the diet and the drugs (if any in use) should be ascertained; any symptoms of general debility, or of cerebral or spinal affection, or of the gouty or scrofulous diathesis, looked to; and if it be necessary, a sound should be passed, and the urethra, prostate, and bladder explored.

Irritability of the bladder will be proved not to depend on acute cystitis, by the absence of any sign of general fever or local inflammation; by the less severe character of the pain, which, too, is not notably aggravated by pressure above the pubes; and by the non-persistence of the symptoms except during the paroxysm.

From chronic cystitis irritability of the bladder is recognized by the state of the urine, and the unimpaired condition of the constitution.

It is shown not to depend on calculus and tumours of the bladder, by the use of the sound, and the absence of those other characteristic symptoms of those affections dwelt on elsewhere.

Albuminuria, diabetes, and a highly acid or alkaline state of the urine, will be discovered by an examination of the quantity and quality of the secretion, and by the presence of the other signs which the diseases giving rise to these states may occasion. When irritability of the bladder continues long, the organ is said to lose its capacity and to contract in size.

(5) PARALYSIS OF THE BLADDER.—This may be complete or incomplete, temporary or permanent, essential or symptomatic. It may constitute part of general paralysis, or be the result of a universal feebleness of the system, causing atony of the viscus, as when it occurs in connection with organic diseases, such as phthisis, grave fevers, or as a result of masturbation. The expulsive power of the bladder, and its sensibility, may be both lost, or the latter may continue. It is not an uncommon affection in old gouty men, and in them it may be very slowly established.

The cause of the paralysis may be seated in the nervous centres, or in the bladder itself. It may result from injury or disease of the brain or spinal cord (in any of its regions); it may depend on reflex action, without any disease of the nerve-centres, as when it follows injury to the lower limbs. It may be due to lesions of the pelvis, operations upon the rectum, tumours pressing on the hypogastric and sacral plexuses, hysteria, nervous exhaustion from bodily fatigue or mental anxiety, &c.

As to causes seated in the bladder itself, paralysis is said in common language occasionally to depend on simple, frequent over-distension of the organ, produced by any cause. The incapacity in such cases to expel the urine, should not, in strict language, be termed paralysis, but over-distension. Paralysis, or want of expulsive power at least, may, however, be due to inflammation of the bladder, violence applied to the hypogastrium, and long-continued pressure in parturition. When paralysis is established and continues, the urine becomes decomposed; it gets fœtid and ammoniacal; thick, with tenacious mucus and phosphatic deposit; and the bladder, in consequence of the irritation thus caused, frequently becomes destroyed by low inflammatory action.

The symptoms of paralysis of the bladder are those of retention of urine, frequently attended with incontinence, for the signs of which conditions the reader is referred to other portions of this volume.

When the catheter is inserted into a bladder that is paralyzed, the expulsive powers of the organ are found to be so much diminished, that the urine flows away very slowly and without the usual force.

In the early stages of the affection the uneasiness felt is referred to the neck of the bladder and the glans penis; but in the latter stages there may be little or no pain. Paralysis leads, if unrelieved, to death by typhoid symptoms and coma.

Occasionally small rounded growths occur in the prostate gland, and by their projection into the canal they mechanically impede the outflow of the urine. As no rectal examination can discover them, their effects are often erroneously referred to paralysis of the bladder.

(6) Polypus of the Bladder.—These tumours are usually benign in their character, and are fibro-plastic in their intimate structure. They may be soft or firm; lobulated or smooth; pedunculated or sessile. In none of its forms is polypus of the bladder a common affection. It is most frequently met with in children, but may occur at all ages. It may be solitary, or there may be many such growths, and their most frequent seat is at the neck of the organ.

The symptoms indicative of polypus are those of irritability of the bladder; frequent desire to micturate, the act being accompanied by straining and pain. There is but little urine passed at a time, and the position of the tumour near the inner orifice of the urethra may occasion detention. Occasionally (only) there is hæmaturia; but this is not usual, nor is it often severe. The urine may contain mucus, and decompose rapidly. The pain is seated in the neck of the bladder, in the penis, and around the pelvis. The finger, introduced into the rectum, may in some cases assist us in recognizing these growths, which have been known to raise the thickened and enlarged bladder so much above the pubes as to enable the mass to be felt there during life. The passage of a sound will probably detect a soft, fixed tumour, round which the instrument cannot be made to pass, and which is neither so sensitive nor vascular as a fungous tumour.

The symptoms above described are in no way peculiar to polypus of the bladder, but are common in a great measure to growths and foreign bodies existing in the cavity. The distinction between a benign tumour, such as a polypus, and a malignant, is made chiefly by observing the absence of that severe hæmaturia which is so persistent and common a sign of malignant disease, and there are no cancer cells or debris in the urine. The persons affected are younger. There is not usually the same progressive emaciation or evident cachexia; still unquestionably cases occur in which our discriminating ability is baffled.

From calculus, polypus of the bladder is distinguished by the use of the sound. This generally suffices; but if, as occasionally happens, the polypus gets coated with phosphatic deposit, this test will not be satisfactory. However, the fixed position of the tumour, and our inability to pass the sound round it, will assist to clear up the difficulty. These remarks, however, it must be admitted, have no bearing on the differentiation of such an encrusted polypus, and a partially encysted calculus of the bladder, nor in many cases can the distinction between these affections be made. In the progress of time polypi, from producing persistent retention, will probably set up cystitis, and cause dilatation of the ureters and suppuration of the kidneys.

(7) Rupture of Bladder may be traumatic or spontaneous. The latter is, however, very rare, and probably only occurs when the organ is previously much diseased. It is in adult males that the accident has been most commonly observed, because they are more exposed to such accidents as may occasion it. It is a rare occurrence in young and old persons and females. It has been generally met with in drunk persons. The posterior wall, where the viscus is covered by peritoneum, is the usual seat of the lesion. It has been alleged that the bladder has given way when the whole body was violently concussed, as in a railway accident,

without any direct local violence; but this is very problematical. It has usually been caused by severe concentrated blows (falls, kicks, &c.), or a crush over the lower part of the abdomen when the bladder was distended. It has also followed violent efforts to empty the bladder when an obstacle existed to the escape of the urine, as in enlarged prostate, stricture of the urethra, &c. It has been in some rare cases known to occur during coitus and the straining of childbirth. When resulting from mere straining efforts, the organ has been probably always diseased.

Spontaneous rupture may take place when the bladder has been long distended, especially if its natural strength has been much diminished by disease.

The symptoms of rupture of the bladder will vary with the part that has given way and the extent of the lesion. The urine may gain direct entrance into the peritoneal cavity, or it may only be effused into the sub-peritoneal cellular tissue. In traumatic rupture the effusion generally takes place into the peritoneal cavity; while in spontaneous rupture most usually the urine passes into the sub-peritoneal cellular tissue, and there it may in fortunate case become walled in by lymph. Generally the effects are rapidly apparent; in exceptional cases, however, they are slowly developed. Sometimes the patient is quite conscious of the accident. He describes how he felt the bladder give way. He is seized with faintness, great pain in the lower part of the belly, generally of a severe, burning character, nausea, vomiting, rapid fluttering pulse, hurried respiration, great anxiety, coldness of the extremities, sometimes intense collapse, hiccup, and delirium. There is much desire to micturate, and the patient finds himself unable to pass any urine. Possibly a small quantity of bloody urine may be passed, and afterwards there may be a considerable amount of blood escape either fluid or in clots. The abdomen swells and becomes painful, and peritonitis or typhoid symptoms follow. If a catheter is passed, no urine at all may be got, or a small quantity only, deeply tinged with blood. Occasionally, however, a large amount is evacuated, in consequence of the end of the instrument having passed into the abdominal cavity, or the rupture being a very large one. If the rent is on the anterior surface of the bladder, and the urine be effused in quantity behind the pubes, its presence may perhaps be recognized above the symphysis by the application of the hand. If the rupture occur at the lower portion of the organ, the point of the catheter may be felt to have passed through it, when we introduce the finger into the rectum. In rupture of the bladder, if we make a rectal examination, the bas-fond can no longer be felt, as it is in the normal condition, and as especially it is found when the viscus is distended; and this, together with the general signs above described, must be our chief means of diagnosis in those cases of spontaneous rupture, in which, from there being an obstacle to the escape of the urine, which debars the entrance of an instrument, we are deprived of the information we might obtain by the passage of a catheter. In those cases in which the urine flows freely by the catheter, its current is continuous, as if it escaped from an inert reservoir; or it may flow interruptedly, ceasing and reappearing as the position of the instrument or that of the patient is changed.

In exceptional cases of rupture, there is for some time little suspicion entertained of the grave injury which has been sustained. The patient complains little, and continues to walk about and attend to his business. Pain and the other symptoms referred to above, set in so soon as the urine has obtained free access to the abdominal cavity, as in some of these cases there is reason to suppose that the absence of any indication of the lesion depends on the rent being valvular, or at least of such a form or size, or being so situated, as that the urine does not (or very little) in the first instance escape from the organ.

When the bladder is ruptured by violence, there will be an account of the accident, possibly ecchymosis, and it may be injury to the pelvic bones. There will be a history of previous distension, the general symptoms which result from a blow, and the information obtained by the use of a catheter to guide us in recognizing what has occurred. If the rupture has taken place spontaneously, we will hear of previous distension, the sudden cessation of the uneasiness which such distension occasioned; probably the feeling of something giving way, and the rapid disappearance of the tumour which previously existed in the abdomen.

(8) SACCULATION OF THE BLADDER, *i.e.* sacs or cavities formed in the walls of the bladder by the protrusion of the mucous membrane through the fasciculi of the muscular coat. This protrusion is at first small, but slowly augments, and may at last come to assume such a considerable size as to enable it to contain much urine.

If after emptying the bladder by the catheter, a change of posture sets free a renewed quantity of turbid urine; if the "fluttering blow" described by Mr. Guthrie be observed (which is not very often the case); if a limited extent of dulness on percussion remain after the bladder has been emptied by the catheter—then we may suspect a sacculated condition of the organ to be present.

**BOIL**, or Furuncle, is a circumscribed inflammation of the deeper portions of the true skin and the cellular tissue beneath, ending in suppuration and the sloughing of a portion of cellular tissue at its centre. It is generally multiple, but may be single, and occurs at any age, although it is most common in the young. It is in plethoric persons of gross habit of body suffering from derangement of the biliary and digestive functions, and in females whose catamenia are irregular, that boils are most commonly seen, yet they appear also in the feeble and "poor blooded." They are sometimes epidemic, and occur in successive crops. They are occasionally critical, and attend convalescence from low fevers and the exanthemata. The favourite seat for boils is the loose cellular tissue of the shoulders, neck, back, and nates. They are also common in the face, axillæ, thighs, and abdominal wall. They never occur on the soles of the feet or the palms of the hands. They are occasionally excited by changes of habit, especially as to diet, and they are common in countries where oatmeal is much used as food.

*Symptoms.*—Small red acuminated hard pimples, attended with burning or throbbing pain, tension, and heat, and ending in suppuration. They may cause irritation and swelling of neighbouring glands, and, if numerous, may be attended with febrile symptoms.

Anthrax is the only affection a boil can be confounded with; and at p. 8[illegible] the distinction is pointed out.

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**BONE**, Diseases of.

A. **Ostitis**, or inflammation of bone, may be caused by disease or injury. It is often apparently due to constitutional causes, such as scrofula, syphilis, or rheumatism. The bones most liable to be affected are the superficial ones, and especially the tibia, the bones of the head, and the ribs. At the outset of the disease there is pain of a heavy, deep, aching character in the bone and throughout the whole of the limb, which is often tender, and it may be red and somewhat swollen. If it arise from injury we are apt to be deceived by the accompanying injury to the soft parts, and to overlook the affection of the bone beneath. When it is due to scrofula the disease is frequently indolent in all its stages; but when syphilis is the exciting cause, the pain is usually severe and of an intermittent character, being especially acute at night when the patient is warm in bed. When due to rheumatism the periods of exacerbation are not so regular as in syphilis, and they are more affected by vicissitudes of weather and temperature. The pain becomes very severe as the disease advances, and contributes greatly to undermine the health and strength by destroying sleep and rest. All use of the affected bone increases the pain. After an uncertain period, as the disease is slow in its progress, the bone is felt to be enlarged, and to present a hard, fixed, irregular, and incompressible swelling on its surface, over which the skin remains free and unchanged in colour. So far ostitis cannot be distinguished from periostitis, nor can it subsequently be discriminated from that affection, when an abscess forms in connection with it, till that abscess bursts. True, in periostitis the swelling forms more rapidly and softens quicker than in ostitis, but this affords but a small ground of distinction.

B. **Osteo-myelitis** occasionally occurs in stumps, and may be undistinguished by any suffering, while at other times there is most severe, wearing-out, aching pain in the bone, accompanied by swelling of the stump, which is found to pit on pressure, and is red all over. The inflammation of the soft parts may so mask the bone affection that the true nature of the malady is not discovered till after death. The further signs of osteo-myelitis merge in those of purulent infection, which is very apt to arise in consequence of the extreme vascularity of the medullary membrane.

C. **Abscess.**—(*a*) *Acute* occurs within the canal of the bone, in connection with the last affection. The pus is diffused, and the disease ends in purulent infection.

(*b*) *Chronic* abscess again appears in the cancellous substance (usually) of bones, and the pus is circumscribed. It is in the neighbourhood of the knee, ankle, and elbow, that it is most generally met with. Its formation is frequently due to the breaking down of tubercular deposit, and it is in the upper and lower end of the tibia that such collections are most common. These abscesses are sometimes very minute, at other times they equal a pigeon's egg in size. They form slowly, and may make little progress for years. They may result from injury, and cause great pain of a remittent character, aching like toothache, and very severe while it lasts. The pain is most violent at night, and the part is frequently tender to the touch at the place where the inflammatory action is most acute, and where the pus ultimately forms or is most superficial. The skin is unaffected unless the abscess works to the surface, when the integuments get red, glazed, and œdematous, previous to giving way.

D. **Caries** may depend on a scrofulous or gouty cause, and it will be by the history of the case, the appearance of the patient, and the concomitant symptoms that we are able to surmise its cause.

Caries attacks by choice the spongy ends of bones, but may be also met with in compact bone that has lost its accustomed density. It follows inflammation, and is evidenced at its outset by the symptoms of inflammation before dwelt on; but as the inflammation is generally of a low type its symptoms may not be very well marked. If, especially in a young scrofulous subject, we find persistent pain in a short spongy bone, or in the cancellous end of a long bone, we may have a strong suspicion that caries is about to be established, but no certainty can be had till the soft parts have given way and the exact state of the bone can be determined.

The swelling or tumour which forms over the carious bone slowly softens, fluctuates, and works to the surface, bursting by one or more openings, giving exit to very fœtid matter, and these openings remain for the most part fistulous. The pus is grumous, often sanious, and contains granules of bone mixed with it. There is found to be a superabundance of phosphates held in suspension in the pus, and this is distinctive of such discharge. A silver probe is discoloured by the pus, as is any lead plaster which comes into contact with it. The fistulous orifices come in time to be surrounded by a circle of dark-coloured skin, with prominent fungous spongy granulations at the openings. When the probe is introduced it comes into contact with a rough surface which is easily penetrated. The probe passes into the bone, sometimes with a crisp crepitant feeling, at other times it communicates the sensation of piercing a soft lardaceous substance. Sometimes there is no pain complained of when the bone is struck with the probe, at other times most severe agony is described as being produced. It is especially in strumous caries that an absence of pain is observed. If the disease is extensive, symptoms of purulent infection may appear in consequence of the absorption of the putrid pus from the bone, and if the disease be seated near a joint, the functions of the articulation may be injured or destroyed.

E. **Necrosis** attacks by choice the middle of the long bones, that is their compact tissue. The bones most liable to the affection are the superficial ones, viz. the tibia, the lower portion of the femur, the humerus, cranium, lower jaw, clavicle, and the bones of the forearm. It may be confined to the outer or inner surface of the bone, being thus either peripheral or central, or it may involve the whole thickness of the bone. In this way it may begin in the periosteum or medullary membrane, or in the osseous tissue itself. It may be traumatic, or depend on such constitutional diseases as syphilis, scrofula, or rheumatism. It may be induced by the weakness which attends certain fevers, or be dependent on the inordinate administration of mercury, or the action of caustics, heat, cold, and phosphorous vapour.

The early symptoms are those of ostitis or periostitis (which see), and to these follow suppuration, which shows itself in the formation of a soft doughy tumour over the affected bone. This tumour is ill circumscribed, and the skin is not affected till the abscess comes near the surface—an event which is not usually long of occurring when the necrosis is peripheral, but which is (like all other stages of the affection) very slow, painful, and tedious when it is the central portion of a bone that is implicated. In this case the whole segment of the limb swells, becomes œdematous, glazed, and it may be red as if affected with erysipelas, and the whole bone feels as if enlarged. Occasionally acute necrosis sets in, with symptoms which closely simulate those of typhus fever; it may have no assignable cause, and be very rapid in its progress.

The pus usually obtains an exit by many openings. Some of these may be far removed from the seat of the disease. They remain for the most part fistulous, but they may temporarily close, or some may heal while others break out. Pieces of bone of greater or less size will usually escape with the discharge; and if the whole dead portion come away, the openings will heal with depressed and adherent cicatrices. The pus is fœtid, and contains a superabundance of phosphate of lime. It is of acid reaction (phosphoric acid), and discolours silver if kept in contact with it. The fistulous orifices are frequently concealed by prominent exuberant granulations, and around them the tissues are condensed and changed. If the bone is examined with a probe, it will be felt hard, impenetrable, and rough, and rings like metal when struck. It is probably reached through an opening in new living bone, the edges of which aperture may be felt as the probe is passed, and the contrast between the dead and living bone observed. The best probe for the examination of the necrosed bone is one made of steel, having a fine point and broad end. Its contact with the dead bone may in some cases be more clearly made out by the application of the stethoscope. It is seldom that this assistance is required; but where a doubt exists as to which of two neighbouring bones is struck, it may be of use to apply the stethoscope to them alternately. Occasionally, when the bone is laid bare, we can recognise by the eye the white edge of the dead sequestrum when the probe has failed to discover it.

By passing two or more probes by different and distinct openings, and impinging them in succession on the sequestrum while the others are left free, the *extent* of the necrosis and its *depth* from the surface may be defined. In the same way the *number* of necrosed portions may be sometimes determined, or at least approximately surmised, and the *mobility* of each part examined. The mobility of a portion of rough hard bone is pathognomonic of necrosis. When the necrosis is central or the sequestrum large, the affection is very slow and chronic, and the constitution may suffer most severely from the pain, waste, and exhaustion which commonly attend it. When necrosis is acute, a shaft of bone may be destroyed in a few days, and then the local and constitutional symptoms are of extreme severity.

F. **Exostosis** may be of cancellous or ivory-like structure—the former growing on the long bones, and occasionally attaining a great size—the latter chiefly occurring on the flat bones, and giving rise to small and compact tumours. These growths are frequently symmetrical in their arrangement on either side of the body, and they are occasionally hereditary, though at other times they appear due to an acquired venereal diathesis. They occur in many shapes—the globular being the most common, and have a greater or less base of connection with the bone on which they are placed. Occasionally, but rarely, they are pedunculated, and hang by a narrow stem. They may be very numerous, and usually they are very tardy in their growth. The cancellous variety occasionally increases with rapidity. An exostosis is sometimes regular, sometimes irregular in its surface, hard, and incompressible, firmly fixed to the underlying bone with which alone it moves, and painless, except it be by the effects of the pressure it produces on neighbouring structures. Occasionally a bursa forms over the tumour, and may deceive us as to the true nature of the growth below, by the soft sensation it communicates to the hand. The sliding of the soft parts, too, over the surface of the growth, may be mistaken, if care is not had, for the movements of the tumour itself. The pressure effects will vary according to the position of the growth. It may produce the most disastrous influences on the brain, nerves, muscles, and special senses, and may impede the action of joints, obstruct canals (as the urethra), close blood-vessels, and displace bones. When exostosis is due to venereal disease, the nocturnal pain is frequently very severe. Till by their growth they come to press on the skin, that structure remains unchanged.

Exostosis may be distinguished from periostitis by the presence of the signs of local inflammation, by the more rapid progress, and soft, doughy feeling of the latter.

The cartilaginous, fibrous, fibro-plastic, and myeloid tumours of bone are treated of under the head TUMOUR.

G. **Cysts of Bone** (*Spina Ventosa*).—The cysts which form in bone may either be simple or compound, unilocular or multilocular. They are met with in adults, and usually occupy the jaw-bones and the articular ends and shafts of the long bones. The tumour forms slowly and steadily for the most part, but occasionally it is observed to be irregular in its progress, growing rapidly for a period and then becoming for a time arrested. It is usually round or oval in shape, smooth on its surface, and at its outset hard and resistant to the touch. It causes little pain till it begins to press on surrounding parts, and the skin is unaffected. When it begins to compress the parts around, it may give rise to a heavy, aching pain, increased in certain states of the weather. It may attain a size equal to that of the adult head. The sub-cutaneous veins enlarge, and the functions of the part in which it is placed become embarrassed. The bone may give way in consequence of being weakened by the growth.

Thus far the true nature of the tumour cannot be determined. As the bone expands and gets thinned, it comes, so long as it is not perforated, to crackle like parchment or thin metal, when it is pressed on, which sensation is very characteristic. After a time we find that this sensation can be no longer reproduced—it is, as it were, exhausted—but after a short period of repose it can be again developed. On examining the surface of the tumour more attentively, it will be observed that while parts are thick and nodular, fluctuation is observed at those other points where the bone has been perforated. It is, however, only when the tumour has given way, or when we are able to examine its contents, that we can accurately determine the character of the growth, and decide whether it be serous, or hydatid, or solid (fibrous, fibro-cartilaginous, or malignant), or partly solid and partly fluid.

H. **Malignant Disease of Bone.**—This is generally encephaloid, though it may be of the osteoid or colloid varieties of cancer. Scirrhus and epithelial cancer also occur in bone, but not as primary affections. It is in the articular ends of the bones of young subjects that malignant disease is most apt to appear, especially in the ends of the long bones of the lower limbs, and above all in the inferior extremity of the femur. It may grow on the external surface, or within the bone alone, or in both parts at the same time. In the long bones it usually begins on the external surface, and in the flat bones within its substance, but usually comes ultimately to affect both sides of the bone. The bone becomes expanded in some cases over the growth. When the disease becomes developed on the external surface of the bone, it is more rapid in its progress, and is earlier recognized.

The first symptom which usually indicates the advent of this formidable malady is a deep abiding pain in the affected bone. It is rare in cancer of a bone that this pain is not observed; yet, occasionally, when the disease only implicates the surface, little or no pain is complained of for some time. A hard, incompressible tumour appears, having an irregular surface. It is closely bound to the bone with which it is incorporated, and (especially when peripheral), as it enlarges, it assumes for the most part a globular shape, and becomes soft and elastic—fluctuant, indeed—at parts of its surface, while it remains hard at others. Frequently it presents a long, oval shape, surrounding the shaft of a bone, and closely bound to it. Sometimes it grows slowly, at other times with great rapidity, and in not a few cases its growth intermits. It may attain a great size, and large sanguineous cysts may be embedded in its substance. The whole limb swells, and it has been occasionally noticed that the bone becomes considerably increased in length. A cancerous tumour of bone, although not always painful, as was before said, is generally the seat of severe lancinating pain, and as it increases, its pressure causes much suffering. The sub-cutaneous veins become enlarged and tortuous; the skin gets thinned, glazed, and tense, and ultimately ruptures, giving exit to a bleeding, fungous, and very characteristic mass. The bone, too, weakened as it is, is liable to fracture. The constitution gives way, cancerous cachexia makes its appearance, the lymphatic glands are invaded, and so the disease progresses.

This disease is recognized by its occurring in the young; by its rapid growth; lancinating pain; peculiar shape and consistence; frequently by its size, by the affection of the glands; the enlarged veins, and constitutional cachexia; by the glazed, tense condition of the skin before the surface is broken, and the fungous appearance of the growth when it has come to protrude—these, together with, it may be, the occurrence of similar tumours in other parts of the body, will, in most cases, serve to distinguish this disease. Occasionally, however, every distinctive feature is wanting; and at other times (rarely, however), there is a pulsation and even a bruit in these tumours, which might easily cause them to be mistaken for an ordinary aneurism; and in many cases the distinction from aneurism of bone is not to be made.

From ordinary aneurism, pulsating malignant disease of bone is to be distinguished by observing—

1. Its site. Malignant tumours are frequently not in the track of a vessel of such magnitude as would give rise to an aneurism, as when they occur on the outer surface of the crest of the ilium.

2. The history and progress of the two affections are different.

3. The pulsation in cancer occurs only when the tumour is large—in aneurism it is observed from the outset.

4. The pulsation, too, is not so direct and marked in cancer as in true aneurism.

5. The sounds heard in an aneurism, by means of the stethoscope (and referred to at p 75), are not the same as those which occur in cancer of bone.

6. Malignant disease is not circumscribed and defined like an aneurism.

7. The peculiar lancinating shooting pain of cancer differs from the uneasiness caused by aneurism.

8. The feeling communicated to the hand, in either case, is different. In cancer the peculiar elasticity of some parts of the tumour, and the hardness of others, contrast with the consistence of an aneurismal tumour.

9. There is frequent lengthening of the bone in malignant disease.

10. In cancer there will be other signs of the affection in the glands and general system.

11. In cancer the superficial veins are enlarged and prominent, and the parts lying over the tumour become in time involved.

12. Cancerous tumours are immovably attached to the bone from which they grow, and cannot be separated from it, while aneurismal tumours are more movable, and we find no intimate connection between them and any bone which may lie below.

13. If the bone is expanded by the cancer, it can be felt crackling on the walls of the growth.

14. The compression of the main vessel close above the tumour does not affect a cancerous, as it does an aneurismal tumour.

15, and lastly. When the main vessel is compressed the tumour itself cannot be diminished by pressure, as it can in ordinary aneurism, and the bone is not felt to be destroyed in the same way by aneurism as it is by cancer.

If the aneurism has become consolidated, many of the characters by which it is distinguished from a cancerous tumour developed in bone are lost, and it is only by attention to the history, former character, and progress of the tumour that we are able to discriminate them.

From rapidly enlarging enchondroma, it is sometimes exceedingly difficult to distinguish cancer of bone. Cancer, however, is less solid and firm to the touch, it is more elastic, and is accompanied by glandular affection and constitutional cachexia, and the overlying parts become amalgamated in the disease. If these points are well marked the distinction may be drawn.

From some rapidly growing cysts, cancer is recognized chiefly by the glandular and constitutional implication, but unless some portion of the tumour is obtained for examination, great uncertainty must in many cases exist as to which of these affections we have to treat.

Osteoid cancer occurs by preference at the lower end of the femur, and shows itself by a tumour or swelling of the bone, which gradually enlarges from above downwards. The swelling is usually of an elongated oval shape, ending somewhat abruptly at the condyles. It is hard and incompressible, smooth on the surface, and attended by deep and abiding pain. Such tumours grow rapidly. The glands are quickly affected, and deep constitutional cachexia appears early.

**I. Pulsatile Tumour or Aneurism of Bone.**—This is a rare affection; but when it occurs, it is usually in the cancellous articular ends of the long bones, especially in the head of the tibia. It is in young adults that it most commonly appears. The tumour may be developed suddenly or grow slowly. Occasionally it takes years to attain any size. It is at times, though not always, referred to an injury. It is of a round or oval shape; is painful; pulsates expansively; and when of any size, communicates a thrill to the hand and ear. Its outline is ill defined, and its base is lost in the surrounding parts. It is continuous with the bone, and firmly attached to it. The skin, long unaffected, gets thin and red, as it is distended, and the veins of the limb ultimately become somewhat enlarged and tortuous. Compression on the main vessel occasionally arrests the pulsation; but as the tumour seldom depends on one source of blood supply, such pressure may only diminish, without arresting the pulsation. When the main current of blood is cut off, the size of the tumour is diminished, and a soft, fluctuating feeling can be perceived, together with the margin or setting of bone which surrounds the growth. The function of the limb suffers both from the direct pressure of the tumour, and also from its interference with the nutrition of the tissues. Any joint lying near the growth may be destroyed; although it is a remarkable fact how the knee joint so frequently escapes, when the disease is seated in the head of the tibia. Crepitation may be observed in the tumour, if the bone is expanded by it. In consistence it is usually irregular, being bony hard at some parts and soft and pulsating at others. There may or not be a bruit heard in these tumours. It is frequently absent, and when it is present, it may be a soft cooing sound or a harsh loud note. Sometimes it is impossible to differentiate this affection from pulsating cancer of bone (the two diseases being according to some observers identical), or from ordinary aneurism of a great vessel; but at other times the distinction may without difficulty be attained.

As regards cancer the perplexity is caused by both tumours communicating to the hand the same sensation, and presenting the same physical characters and progress. Both are bound to, and are amalgamated with the bone. Both have plates of bone in their walls; but if the glandular affection and constitutional cachexia be apparent; if the tumour is little, or not at all affected by pressure applied to the main vessel, and to the tumour itself after such compression has been employed; if there be a bruit observed as well as a pulsation, and no thrill, or whiz, or retraction; and if the bone is lengthened—then we may conclude that it is cancer. This opinion will be the more strengthened, if several such growths occur in the body, and if the one under examination be situated elsewhere than in the articular ends of the long bones. In aneurism, too, the pulsation appears early, while in cancer it is not observed till a late period of the disease. Lastly, in aneurism the hard margin of bone round the soft tumour, if distinguishable, is very characteristic.

Aneurism of bone may be contradistinguished from ordinary aneurism by its site; its firm incorporation with the bone which it destroys; by the osseous plates felt in its walls; and by the margin of bone found encircling its soft, doughy, pulsating mass. Aneurism of bone, too, causes a less vehement beat than true aneurism, and it communicates a peculiar thrill to the hand. The effects of pressure on the main vessel, and on the tumour subsequent to such compression, are less marked; and, lastly, its outline is much less perfect.

**BRAIN.—A Compression of the.**—May result from the effusion of blood, the depression of bone, the impaction of a foreign body, or the formation of pus. In the second and third case the effects are rapidly established; while the first may take place after an interval of greater or less duration, and the last only when suppuration has had time to become established. Whatever may be the cause, the signs of compression are as follows. Loss of intelligence and memory; and generally paralysis (not always) of motion and sensation. This paralysis may affect one or both sides of the body, or be even limited to one set of muscles. The pulse is slow, laboured, and sometimes irregular. The pupils, though sometimes natural, are most frequently dilated and insensible to light. They may, however, be both contracted, or may be in different states on opposite sides. The skin is of natural heat, or the temperature is exalted, and the surface perspiring. The breathing is slow, deep, frequently stertorous, and accompanied by blowing. There is retention of urine (occasionally incontinence), and the fæces are frequently involuntarily expelled.

Blood may be found poured out in various places—(1) between the bone and dura mater; (2) between the dura mater and arachnoid (very doubtful); (3) within the arachnoid (most common place); (4) in the pia mater; (5) in the substance or cavities of the brain.

The effusion of blood may result from contusions, wounds, or spontaneous rupture of a blood-vessel.

It is from *compression*, as resulting from the extravasation of blood independent of fracture or foreign body (the presence of which is usually apparent), that *concussion* has to be distinguished; and while certain signs will be hereafter enumerated which serve to differentiate these states when they are well marked and characteristic, still it must be borne in mind that the two conditions are very seldom in actual practice found distinct, but, on the contrary, that they very frequently run into one another, or are combined so that a distinction is not to be drawn between them. Compression very seldom exists without concussion, and in truth no combination of symptoms can be said to draw a line between slight compression and slight concussion.

<table>
<tr><th>COMPRESSION.<br>(Severe from any cause.)</th><th>CONCUSSION.<br>(Severe and uncomplicated.)</th></tr>
<tr><td colspan="2">1. <i>Insensibility.</i></td></tr>
<tr><td>Deep. Sometimes established after an interval of time (more or less long) from the occurrence of the accident, and after the first effects have passed off. It continues stationary or tends to augment in intensity. Patient cannot be roused. Special senses in abeyance.</td><td>Not so deep (except in exceedingly severe cases), but that the patient can be roused, though he immediately relapses. It appears at once on the receipt of the injury, and is most marked at its outset. It tends to pass off spontaneously. The special senses act, but feebly.</td></tr>
<tr><td colspan="2">2. <i>Temperature.</i></td></tr>
<tr><td>Natural or increased.</td><td>Lowered (collapse).</td></tr>
<tr><td colspan="2">3. <i>Motion and Sensation.</i></td></tr>
<tr><td>Paralysis of one or both, but the latter less than the former. Paraplegia, hemiplegia (generally), or paralysis confined to one set of muscles. Sometimes (more rarely) general convulsions, or convulsions on one side and paralysis on the other (in very severe cases).</td><td>Rarely paralysis, and then transient; weakness, however, and the limbs flaccid.</td></tr>
<tr><td colspan="2">4. <i>Respiration.</i></td></tr>
<tr><td>Slow, deep, frequently stertorous and blowing.</td><td>Feeble, sighing (rarely stertorous).</td></tr>
<tr><td colspan="2">5. <i>Pulse.</i></td></tr>
<tr><td>Full, slow (frequently very much so), soft, laboured, irregular.</td><td>Feeble, rapid, sometimes intermittent and flickering.</td></tr>
<tr><td colspan="2">6. <i>Eyelids.</i></td></tr>
<tr><td>Closed and immovable.</td><td>Open and movable.</td></tr>
<tr><td colspan="2">7. <i>Pupils.</i></td></tr>
<tr><td>Usually dilated; but sometimes natural, sometimes contracted, and occasionally one contracted and the other dilated. Very sluggish, or totally insensible to light.</td><td>Usually contracted, but variable. Act feebly, but are generally sensible to light.</td></tr>
<tr><td colspan="2">8. <i>Sphincters.</i></td></tr>
<tr><td>Usually retention, sometimes incontinence of urine, and a torpid state of the bowels difficult to overcome.</td><td>Incontinence of urine and involuntary evacuation of fæces.</td></tr>
</table>

9. *Vomiting.*

| | |
|---|---|
| Absent when fairly established. | Frequent as the concussion passes off. |

Lastly, all the symptoms of compression, as a rule, tend to augment; and those of concussion to become ameliorated.

To diagnose with accuracy the exact portion of the brain that is compressed has been often tried; and while in some cases the peculiarity of the symptoms has enabled observers to do so, yet to accomplish it with any degree of precision is, as a rule, impossible. We can, however, occasionally surmise in a general way from the part paralyzed, where the compression is seated, as the rule is that the paralysis affects the limbs on the opposite side to that on which the brain is injured. The presence, too, of a puffy tumour or a wound on the skull; and the patient (if he is conscious) complaining of a pain fixed at one spot; or the hand being constantly carried automatically to one part of the head, will further tend to confirm our opinion. None of these indications are of much value (except perhaps the paralysis) taken by themselves; but if such a combination exists as a puffy tumour on one side and the paralysis on the other, then the evidence is pretty conclusive. The *rule* as to the relationship existing between the paralysis and the place of pressure on the brain is as stated above; but a considerable number of cases are now on record in which the paralysis and the pressure have existed on the same side. If the paralysis be localized and confined to one small part, then we may be led by anatomical and physiological considerations to the seat of the compression.

A wound becoming unhealthy, and the bone below being bare and dry, especially if combined with paralysis on the opposite side of the body, has been generally looked upon as evidencing the formation of pus beneath that part, though without the paralysis these signs are of no value. The mere seat of the blow being apparent does not in itself indicate the position of the effusion, as it may be on the opposite side of the head altogether from the part struck. The blood effusion may be accurately surmised to lie at the base of the brain if we have signs of fracture of the bone at that part, such as extensive ecchymosis of the eyeball, severe and persistent hæmorrhage from the ear, facial paralysis, amaurosis of one or both eyes, &c. Compression from the effects of injury and apoplexy are distinguished by the history, the evidence of injury, and possibly the age and appearance of the individual. From drunkenness (though it is to be remembered they may be combined) by the smell of the breath and of the matters vomited, the more rapid pulse in drunkenness, and there being no stertor properly so called. Besides these indications, we have the habits of the patient and the evidence of injury.

B. **Concussion**, *i.e.* general shock of the brain. The symptoms follow the injury immediately, and vary much in intensity. They may be very transient, or almost immediately fatal. The following are the symptoms usually present in cases of severe concussion :—

1. *Sensibility and muscular power* more or less completely lost, and that for a variable time. It may be only for a few minutes, or for a prolonged period. In very slight cases there may be only transient giddiness or a feeling of faintness and confusion.
2. *Respiration* feeble, but tranquil.
3. *Pulse* flickering, feeble, regular, or intermittent.
4. *Pupils* usually contracted. Occasionally dilated. Sometimes one contracted, and the other natural or dilated.
5. *Temperature* depressed. Surface cold.
6. *Face* pale, sunk, collapsed.
7. *Sphincters* relaxed. Incontinence of urine, and involuntary discharge of fæces.
8. *Limbs* flaccid.
9. *Vomiting* frequently occurs during reaction, but is seldom attended by nausea.

Concussion is apt to be followed by feebleness of the functions of the brain, irritability of the encephalon, and the destruction or imperfect establishment of some of the special senses, and possibly even by inflammation of the brain.

Concussion is to be distinguished from compression (see p. 142), intoxication (same as above), and contusion of the brain (see below).

C. **Contusion of the brain.**—This condition is recognized, according to some, by a distinct set of symptoms. These are enumerated below. That the brain is contused in many cases in which concussion alone is supposed to be present cannot admit of a doubt; while, on the other hand, the brain is found, in not a few cases examined after death, to have sustained contusion when none of those symptoms usually supposed to indicate its presence have manifested themselves during life.

The alleged signs of contusion are a state of insensibility, accompanied by great restlessness and agitation, together with tonic spasms of the muscles of the face and limbs. The patient can be partially roused by loud speaking, and then much fretfulness of temper is evinced by his manner. The breathing is slow and deep, and he sleeps without stertor. The pulse is weak and slow, the surface cold and pale. There is drooping of an eyelid and contraction of one pupil. The sphincters are in general in a natural condition; but occasionally there is retention of urine and an involuntary discharge of fæces. If the patient is roused, his speech is faltering and inarticulate. This condition passes generally into encephalitis, delirium, general convulsions, paralysis, and death.

It is alleged by some that the symptoms of contusion are not in general developed for four or five days in their full intensity after the receipt of an injury, so it is said that if inflammation follow a severe injury after a few days' interval, that injury being marked at its outset by the symptoms above described, the lesion is more likely to be contusion than concussion.

D. **Meningitis** may be due to injury, to the effects of sunstroke, to the irritation of tubercles developed in the membranes of the brain, to rheumatism or syphilis, to disease extending from the ear or nose, and it is said even to intense mental application.

When it results from injury, it usually appears in from twelve to twenty-four hours.

Acute meningitis, when fully established, declares itself by the following signs. It is when it affects the upper surfaces of the hemispheres that it occurs in its typical form. The symptoms at the outset are those indicative of excitement and afterwards of compression. The future progress of the case is either one of returning health or towards death. Rigors and chilliness (the rigors sometimes intermit so as to simulate ague), leading to general pyrexia, dry and hot skin, hard and rapid pulse, quick, irregular, sighing respiration, face at first pale and then flushed, eye suffused and eyebrows knit, intolerance of light and sound, pupils contracted and oscillating, afterwards squinting and double vision, violent pain in the head, which undergoes exacerbation, especially on movement, and which, in children, frequently elicits a peculiar shrill cry. This pain is an early and marked symptom. The face is anxious and the head hot. There is morbid sensibility of the surface of the body, and disordered sensations, such as formication, tingling, &c., are complained of. The temper is irritable and fretful. There is wakefulness or somnolence, or these conditions may alternate. There is great thirst, and scanty, high-coloured urine. The bowels are costive, and the evacuations dark and offensive; there is frequently vomiting without nausea or epigastric pain; there is generally violent delirium, eventuating in stupor and complete coma, as effusion takes place and the brain is compressed.

Great restlessness, spasmodic action of the muscles, or general convulsions, are common and important symptoms of meningitis. The convulsive movements may be confined to one limb, or be general over the body. In the latter stages of the disease there is usually paralysis.

In the *chronic form of the complaint* we have the same symptoms as those which mark the acute disease, only less obvious and intense and slower in their progress. The disease becomes established often very insidiously, or remains after the subsidence of the acute symptoms. The delirium is seldom violent, or the intelligence and functions of motion and sensation so interfered with, as in the acute form of the disease.

E. **Encephalitis,** *acute.*—May come on suddenly, or slowly and insidiously, at varying periods after an injury. When acute, it usually appears within forty-eight hours. It is in general combined with meningitis, and then the symptoms of each malady will contribute something to produce the general effect.

The symptoms of encephalitis are chills, followed by general fever. There is frequently vomiting early in the disease, and this may continue throughout—the stomach rejecting everything introduced into it, and yet the tongue remains clean, and there is no tenderness in the abdomen. The pulse, at first low, becomes irregular, hard, frequent, and bounding. There is strong action of the carotid and temporal arteries. The face is at first pale and then flushed; the surface is hot and dry. There is severe, heavy, fixed, or shooting pain in the head. This pain is deep-seated, and is frequently one of the earliest symptoms. The intelligence is impaired. There is loss of memory and irritability of temper. The special senses act imperfectly, and their function is finally destroyed. The eyelids remain closed, the eyeballs are injected, brilliant, and wild, and the pupils contracted. The speech is difficult; and as the angles of the mouth are frequently retracted, the expression of the face is very forbidding. There is somnolence or extreme wakefulness. Clonic or tonic contractions of the limbs occur, accompanied often by much pain. The sensibility is perverted or destroyed in portions of the body. Locomotion gets feeble, and general muscular debility, ending in paralysis, is a common condition. There is great thirst. The bowels remain obstinately costive, and the urine is retained or evacuated involuntarily. Delirium precedes death, which takes place after a period of collapse by coma.

Only some of these symptoms may appear, and they may be variously combined. Occasionally one symptom or set of symptoms take the lead, and chiefly attract attention. In exceptional cases there are very few symptoms of any kind.

It is very rare that encephalitis is met with distinct from meningitis, yet certain symptoms may be stated as appertaining to each when they are so dissevered.

In encephalitis the anæsthesia and paralysis, and the loss of function in the brain, appear at a comparatively early period, and there is less excitement at the outset. In meningitis the delirium is more furious; the spasms more severe; the convulsions more marked; the pain greater; and the fever higher—in short, in it the stage of excitement is more apparent; while it may be added, that the symptoms of compression do not set in so early.

Encephalitis is distinguished from apoplexy by the history of the case—the excitement, delirium, convulsions, &c., preceding the coma and paralysis. In apoplexy there is a sudden invasion, and hemiplegia sets in at once.

From delirium tremens, encephalitis is distinguished by the busy delirium and the tremors which characterize the first-named affection; by the history of the case and the patient's habits; by the delusions, the perspiring surface, the white, moist, tremulous tongue; and by the absence of convulsion and stupor.

One form of typhoid fever may give rise to symptoms which closely resemble those of inflammation of the brain; but the abdominal symptoms peculiar to typhoid fever will distinguish it, together with the fact that the head symptoms appear late in the disease.

An anæmic condition of the brain may in some instances simulate encephalitis, and must be most carefully distinguished from it, as the treatment required in either case is of the most opposite kind. The appearance and history of the patient and his attack, will assist us to recognize the condition referred to, together with observing that there is no nausea or vomiting, or violent and abiding headache—that the same low delirium and contraction of the pupils do not exist, nor yet the perversion or preternatural augmentation of the sensibility or acuteness in the special senses that we find in encephalitis.

*Chronic encephalitis* may not appear for weeks after an injury, and may then appear very insidiously or very rapidly. Usually it begins by dizziness, lassitude, inaptness for business, irregular appetite, deranged digestion, fretfulness, broken sleep, passing on to delirium, convulsions, paralysis. and coma. In this way the functions of the brain are slowly invaded and destroyed.

It may be by the aggravation of some symptom which has persisted since the receipt of the original injury, that chronic encephalitis first declares itself; or convulsions may at once set in, without almost any previous warning.

Chronic encephalitis is hardly to be distinguished from *ramollissement* following hæmorrhage, or from a condition dependent on arterial obstruction. Hæmorrhage, however, sets in suddenly with signs of compression, and is thus distinguished from the affections under consideration.

Breast. *See* Mamma.

Bronchocele. *See* Thyroid Gland.

Bubo. *See* Groin.

**BURSÆ**, Affections of.—When inflamed, or the seat of dropsical swelling, bursæ form tumours, the recognition of which is important. This is not in all parts equally easy. It is necessary to bear in mind the various positions in which the *normal* bursæ lie, and also those sites where *accidental* bursæ (that is, those which are developed to fulfil special exigencies in the economy) may be met with. Anatomy teaches us where to look for the first, and pathology directs us to the second.

The normal bursæ are found chiefly on the extensor side of a limb, and wherever free motion is desired and destructive pressure to be guarded against.

A. **Normal.** *Head and Neck.*—Bursæ are met with under the chin, behind the angle of the lower jaw, and in front of the thyroid cartilage.

*In the upper extremity* they occur on the acromion, beneath the subscapularis; under the deltoid (the two last may communicate with the shoulder-joint); on the external and internal condyles; olecranon (miner's elbow); styloid process of radius and ulna; dorsal surface of the phalangeal and carpo-phalangeal articulations, and on the palmar surface of the last.

*Trunk.*—Below the latissimus dorsi; at the lower angle of the scapula; behind the mamma, and between it and the pectoralis (not invariably).

*Pelvis and lower extremity.*—On the anterior superior spinous process of the ilium; on the tuberosity of the ischium; on the great trochanter; under the gluteus maximus; below the psoas and ilicus, and between their tendons and the hip-joint (sometimes communicating with the joint); under the crurius (occasionally communicating with the knee-joint); on the lower aspect of the patella, and also on its external and upper angle; under the patellar ligament; on each condyle of the femur; under the hamstring tendons; on the tuberosity of the tibia; on each malleolus; on the dorsal surface of the articulations of the toes; on the calcaneum; under the plantar surface of the head of the first and fifth metatarsus ("bunion").

B. **Accidental Bursæ.**—On the external aspect of the temporo-maxillary articulation; on the posterior surface of the left ulna, and the posterior surface of the second and fifth metacarpus of the right hand, in paper-workers; on the spinous process of the seventh cervical vertebra; on the projections of posterior curvature of the spine; in the lumbar region, and on the sides of the dorsal vertebræ, in those who carry burdens; on the external surface of the great dorsal muscle; in front of the sternum, in those who press the part in their employment (*e.g.* joiners; who are also liable to growths on the chin, both due to pressure by the brace and bit; on the external surface of the upper extremity of the fibula; on the external and anterior surface of the thigh (in organ-grinders); on the dorsal and plantar surface of the scaphoid; the external surface of both extremities of the fifth metatarsus, in flat-footed persons; on the inner and posterior aspect of the first metatarsus; over the tarso-metatarsal joint; on the part of the foot rested on in club-feet; over unreduced dislocations and ununited fractures; on the end of stumps, &c. &c.

Tumours due to enlarged bursæ may form in any of these positions, but few of them are met with in actual practice.

The bursæ which are most liable to morbid enlargement are those over the olecranon and the patella. This arises from their position and size. The former is common in miners, and the latter in housemaids, washerwomen, tilers, masons, potters, quarrymen, pavers, &c.

When bursæ are enlarged in consequence of acute inflammation, there will be the usual local and general signs of inflammation; that is, if the affection is at all severe. The complaint will make itself apparent by the occurrence after injury of a painful throbbing tumour at the seat of a bursa. The pain is increased by pressure and motion, and the swelling assumes a globular shape, and fluctuates. The inflammation may extend by continuity to the joint, and there may be around the swelling a good deal of œdema. It may be mistaken for a common abscess; but the site, circumscribed shape (for though the surrounding parts participate in the swelling, yet the prominence is clearly over the position of the bursæ, and it is at that spot that the fluctuation is most marked), and rapid development of the fluctuation (before pus could form); together with the absence of the hard, phlegmonous mass which precedes suppuration in abscess, will distinguish them

As to the distinction between bursitis and inflammation of an articulation, it may be said that acute bursitis is seated over and on the bone (not at its sides), which covers the joint; it obscures the bone, and spreads from a centre outwards, till it covers its external surface. The articulation can be moved without pain, unless such movement be carried so far as to stretch the parts covering the bursa, and even then the pain is not so acute as when the synovial membrane is inflamed. The outline of the articulation at all other parts is retained, and the history of the case will further assist us, as the progress is much more rapid and the tumour appears sooner than when the joint is inflamed. The skin, too, becomes sooner involved.

Chronic dropsical enlargement of a bursal sac may be taken for a cystic tumour, a cold abscess, or even a solid tumour (simple or malignant). When the walls become thick from deposition, this last mistake is very apt to be made. But the distinction is found by considering the slow, indolent increase of the bursa at a point where some pressure or other irritation has been long applied; by the size of the tumour being generally proportioned (though not always, as they have been seen of very great size) to the known dimensions of a distended bursal sac; and the hemispherical shape which these swellings assume. Occasionally they have a constricted base, more rarely they are oblong. Such tumours remain long stationary, if not injured, and so inflammation set up. They are painless, causing annoyance only by their position and bulk. The skin over them is healthy, and the tumour lies free in the tissues. Frequently crepitation on pressure is observed, from the rubbing together of small fibro-plastic bodies within. Occasionally these tumours are transparent, but this is rare, and never noticed in old bursæ.

"*Housemaid's Knee*" presents the characters above described as indicative of acute or chronic bursitis. When inflammation seizes this bursal sac, and free swelling and effusion takes place, the front of the joint is sometimes quite masked by it; but the history of the case, the occupation of the patient, the swelling having begun over the patella and superficially to it, and coming to cover and hide the bone (and not being under and raising up the patella), will at once point out the true nature of the malady. Further, there being no indication of joint disease, and not such constitutional disturbance as would attend an acute attack of inflammation in the joint; the movement of the articulation being free so long as the integument over the swelling is not pressed on, and the act of bringing into contact the articulating surfaces not causing any pain; and the fluid falling to either side, especially to the outer side of the knee—all these circumstances will at once point out to us the nature of the case in hand.

"**CALCULUS VESICÆ.**"—The symptoms of this affection vary much in different cases. Sometimes even when the stone is of considerable size, there are no distinctive signs of its presence; in other instances, after a long period, during which there have been but slight signs of irritation, the full train of symptoms due to a foreign body in the bladder set in suddenly and with violence. Sometimes, again, after all the symptoms have been well marked for a time, they unaccountably disappear, to recur again at some future date, or even to remain (as has been seen in some rare cases) for ever afterwards in abeyance, although the calculus still continued in the bladder, and was there found after death. This cessation, temporary or permanent, of the symptoms, has been attributed in some cases to an improvement in the general health, in other instances to the calculus becoming adherent or sacculated; sometimes, again, it would appear to be due to the stone passing into or out of a vesical pouch.

The circumstances which appear to exercise an influence on the urgency of the symptoms are—

(1) The size and description of the calculus (those of irregular shape and surface being the worst), and the stone being loose in the bladder.

(2) The condition as to healthfulness of the bladder in the first instance, and, secondarily, of the kidneys.

(3) The degree of derangement in the urinary secretion.

(4) The constitution and irritability of the patient.

Phosphatic calculi cause usually a high degree of irritation, on account of the state of the general health and the condition of the urinary secretion which causes or accompanies that species of stone.

The ordinary symptoms of stone in the bladder have been divided into Rational and Physical.

*Rational.*—That is, those symptoms which depend on the physiological effects of the calculus. These are, for the most part, those of irritation of the bladder (see p. 122). The bladder, too, may be chronically inflamed in consequence of the irritation produced by the calculus, and symptoms indicative of vesical catarrh (see p. 120) may appear.

Frequent and painful micturition is often the first symptom which attracts attention. This may be very slight at first, and very slowly increase. The urine is at last frequently expelled in small quantities and with much straining effort, and the spasm continues for some time after the bladder is emptied. In children prolapsus ani is very commonly produced by the straining, and in the adult hæmorrhoids not unfrequently result. On careful inquiry it will be often found that, previous to the setting in of symptoms of vesical irritation, the patient suffered from signs of stone in the kidney, and that these symptoms ceased suddenly as the stone reached the bladder. Both retention and incontinence may be met with in calculous patients; but a feeble control over the discharge, with frequent desire to evacuate the organ, and the necessity for rapidly obeying the impulse, is the most common condition. The incontinence has been supposed to arise from the bladder not being able wholly to contract in consequence of the presence of the stone, and the urine as it is distilled escaping by the side of the calculus. It occasionally happens that the bladder can be voided only when the patient assumes one position, or at least the act is easier accomplished in one posture than in another. In this way most curious attitudes are occasionally assumed. The erect or recumbent posture, kneeling, leaning on the hands and toes, elevating the pelvis, &c., are found to give most relief.

The pain attending calculus is often most severe, and chiefly follows the discharge of the last drops, when the stone may be supposed to come into contact with the neck of the bladder. This pain is most usually felt in the glans penis; but there may be much uneasiness—often a dull weight deep behind the pubes—in the bladder itself. Pain is also complained of in the perineum or in the rectum, or it may shoot round the pelvis into the groins, and even down the thighs and legs to the knee, heel, or the soles of the feet. It is occasionally most severe when the patient goes to stool, especially if his bowels are costive. Pains in the rectum alone, or in distant and unconnected parts, as in the arm, shoulder, and leg, have been caused apparently solely by stone in the bladder. There may be much irritation and excited action of the bowels, and the testicles may also be tender, swelled, and retracted.

Priapism and seminal emissions are rare, but occasional symptoms of calculus; and elongation of the prepuce, from pulling at it to relieve the pain in the glands, and in the female elongation of the labia, produced in the same way, may be found, especially in children. Sometimes the patient learns to relieve the uneasiness by pressing on the perineum or anus, or even by inserting the fingers into the bowel, so as the more effectually to press the neck of the bladder. It is, however, to be remembered that a similar pulling of the prepuce to that here referred to may depend only on the irritation caused by congenital phymosis, and that the incontinence of urine which is so common a sign of stone may depend on the same cause. In truth, phymosis with a narrow orifice may occasion symptoms in every way similar to those of stone in the bladder.

The sudden stoppage of the stream as it flows, caused by the calculus mechanically closing the inner orifice of the urethra, and its resumption when, from change of position, the obstacle is removed, is a leading sign of the presence of such a body as a stone in the bladder. This symptom, too, may, however, be produced by any foreign body which can fall against and close the entrance of the urethra.

Hæmaturia in a slight or severe form (induced generally by any sudden or violent movement, such as jumping or travelling in a jolting vehicle) is often present. The escape of a small quantity of red blood after exercise is always a very valuable sign of calculus; and the passage constantly of mucus or pus when chronic cystitis has been produced is observed in not a few cases, and is a most suspicious circumstance. In the early stages of calculous disease, the detection continuously, by means of the microscope, of blood in the urine, would lead to the fear that a calculus existed in the bladder, and it should always be looked for in suspected cases.

If the kidneys are diseased, there will also be albumen in the urine.

It will be apparent that none of the foregoing symptoms, either singly or conjointly, *prove* the presence of a stone in the bladder; they only render such an event highly probable. Various tumours of the prostate or bladder—especially polypi incrusted with calcareous matter; phymosis, as was before said; worms; an unhealthy condition of the urine; tubercular disease; stricture of the urethra; dilated ureter or kidney; sacs in the walls of the bladder; or even a weak and irritable state of the general system—may give rise to symptoms easily confounded with calculus; hence, in order to complete the diagnosis, we have recourse to the

*Physical signs.*—Indications which are independent of any physiological action. It is by the use of sounds chiefly (see p. 56) that the actual presence of the stone is determined. Occasionally the stone may be clearly recognized by the finger introduced into the rectum; and, if large, it can be in children "ballotter" between a finger in the rectum and a hand over the hypogastrium; but a tumour of the bladder, or rectum, or prostate, or even an hypertrophied condition of the vesical walls, may thus be mistaken for a stone. In the female, however, an examination by the vagina is sometimes of great use.

The sound employed for examining the bladder should be full sized; made of steel, and have a short curve, which will enable it to be turned in all directions and search behind the prostate. Those with a slightly bulbous extremity, or those having a short, rectangular, hollow stem, with a stop-cock attached, are the best of all. It may be necessary to employ instruments with different curves in difficult cases, in order to fulfil certain ends. Eight or ten ounces of urine should be retained, if possible, in the bladder, or some such quantity of lukewarm water injected, if the organ is empty. By employing a hollow sound, the quantity of water in the organ may be varied, and thus a better opportunity got of detecting the presence of the stone. The bowels should, if possible, be relieved by enema before the search is made. The patient is best placed in the recumbent posture at first, with the shoulders somewhat raised and the lower limbs flexed and separated. This is the best position to begin with; but if a difficulty should arise in finding the stone, it may be requisite on this or a subsequent examination to make the patient assume other postures, as lying on either side, kneeling, standing, having the pelvis raised, and the head and shoulders lowered, &c. &c. It is best to employ chloroform, as by its means pain is annulled, and obstacles are removed to the complete and perfect exploration of the organ. In children chloroform is especially useful, by preventing spasm and struggling. The examination should be conducted with as much gentleness and rapidity as possible. All injury to the bladder will be thus obviated. When the instrument is passed, it often happens that it comes into contact at once with the stone, and a peculiar click is noticed, such as is produced by striking metal and stone together without the body. The clearness of this sound will somewhat depend on the nature of the concretion, as some calculi (hard and dense ones) give a much clearer note than others. There is at the same time communicated to the hand a sensation, which is perfectly distinctive in those cases in which it is clearly obtained, of contact with a stony body. When the stone is small, it is just as the point of the instrument enters the bladder that we are most apt to come into contact with it; if it is not then struck, it may be difficult again to find it. Occasionally the sound glides over the surface of a large calculus, and fails to communicate to the hand so clear evidence of its presence as we get from a stone of medium size.

The experienced surgeon gains by an examination with the sound a considerable amount of knowledge over and above the simple fact thât a stone is present. The state of the urethra and prostate; the size of the concretion (by the extent of sur face over which the instrument passes); its probable nature (hardness or softness by its sonority when struck, roughness or smoothness, &c.); its position; there being one or several; its looseness or fixture, &c. &c. He can also form an opinion of the state of the bladder—its capacity and tolerance; whether it is fasciculated, lined by sabulous matter, contains growths, &c.; and in this way is able to decide as to future proceedings. If the stone is not found in the usual way, the whole interior of the bladder should be searched by turning the sound in different directions, and making it traverse successively either side, the bas-fond, the anterior and posterior wall, and the summit. Small calculi generally lie to the side of the middle line. The right-angled sound answers admirably for these examinations, as does a short, curved, bulbous instrument. The sound should be gently thrust towards each part, and the posture of the patient varied at the same time. By introducing the finger into the rectum, the bas-fond may be so raised that a stone, otherwise escaping contact, may be struck. It may be necessary entirely to empty, or more largely to inject the viscus (by means of an elastic bottle and a hollow sound) before the stone is detected. Injecting cold water repeatedly, so as to cause the bladder to contract on the sound, has been suggested by Civiale; but the best way is to use lukewarm water, and to allow it gradually to escape through the instrument, while a slight movement is kept up, so as to enable us to recognize the contact of the stone so soon as it is brought to the inner orifice by the fluid.

The application of the stethoscope to the perineum or sacrum, or above the pubes, has been suggested in cases where it is difficult to recognize the contact of the sound with the calculus; and an American surgeon has advised the filling of the bladder with air, so as to provide a better conductor for sound. Moreau, again, invented "a stethoscopic sound," for the more easy recognition of the contact; and a metallic instrument, with a broad disc of wood let into the handle, is in common use in some parts of this country for the same purpose. These are useless inventions, as no surgeon would depend upon the evidence thus alone obtained of the presence of calculus, and the ordinary sound, in competent hands, quite fulfils all requirements.

The lithotrite is sometimes a most useful exploring agent. From its shape the bladder can be very carefully examined; while by grasping the stone in its jaws, the size and consistence of the calculus can be accurately determined, and the presence of more than one stone easily ascertained, as when one is grasped, contact with other calculi will prove there are several in the organ.

When a stone is encysted, the symptoms are seldom so violent as when it lies loose. The pain is not so severe; there is no sudden stoppage of the flow of the urine, and there is seldom hæmaturia. In such cases the stone will only be found by the sound when it reaches one spot, and for that reason it will only be at times detected. An intumescence or soft projection of the bladder will be observed around it, and the instrument cannot be passed under the stone.

It frequently happens that a calculus eludes the sound, and although it may have been struck before, and the rational symptoms render its continued presence a matter of certainty, yet such presence cannot be demonstrated by contact. This may depend on the calculus being very small; the bladder being so contracted that the sound does not reach all its parts; the stone being inclosed in a pouch (especially at its upper part); there being too much water in the bladder, so that the stone is lost in it; or it may be concealed by a growth in the bladder or in the prostate; or it may be coated with mucus, and so remain undetected; or it may lie deeply in the bas-fond behind the prostate; or it may be hid by a dilated ureter or a hernia of the bladder. All of these circumstances have produced the above effect. In such doubtful cases repeated examinations must be made before an opinion is given.

Again, cases are on record in which it has been supposed that a stone was struck, and yet no such body was found on operation. This has occurred to men of so great eminence as to obviate the idea that it depended on want of experience in conducting the examination. Various causes have been supposed to account for this error; such as the contact of the sound with tumours of the bladder or pelvis (especially exostosis), contact with the displaced uterus, or with hardened fæces in the rectum, or calculi in the urethra and prostate, or with the walls of a fasciculated bladder, roughened by sabulous matter. In such cases, however, there is no distinctive click, but a grating only, or a dull sensation of contact, and the body cannot be isolated as a stone can. The prominence of the sacrum, the brim of the pelvis, and the spine of the ischium, have all been supposed, in some cases, to have been the part struck, and to have produced the sound and sensation thought to be due to a calculus. Bony tumours of the pelvis, cysts of the bladder, &c., have undoubtedly, in other instances, been the cause of error.

In examining the bladder in a case of stone, there are some other points on which the surgeon wishes to make up his mind, and which it is right here shortly to allude to. 1. The determination of the *size* of the stone, by passing the sound over its surface, or by grasping it with the lithotrite, has been already referred to. Velpeau invented an instrument expressly for the purpose of measuring calculi, on the principle of Heurteloup's "Lithotripteur," and Civiale's "Litholabe" accomplishes the same thing to some extent. A sound which opens, and is provided with an index to mark the divergence of the limbs, will, with considerable accuracy, give us an idea of the size of the stone. Further, the size of the concretion can be surmised by forming an opinion, from an examination of the urine, of what kind of calculus is probably present, and inquiring the length of time the symptoms have existed; for, while phosphatic calculi form quickest, the uric acid and oxalate of lime are slowest, and the mixed calculi and those of urate of soda are intermediate in their speed of formation.

2. The *number* of calculi can be judged of by (as was before remarked) grasping one stone with the lithotrite, and seeing whether others can be struck while the first is fixed.

3. The *kind* of stone may be pretty accurately judged of by careful and repeated analysis of the urine for some time, so as to know what deposit it throws down. If the urine is alkaline, and there be much phosphatic and purulent or mucous deposit, and if the other symptoms are in keeping, we may be almost certain that at least the later formation of the calculus is of the soft phosphatic description. If, on the other hand, the urine is acid, we examine it by the microscope, and are thus able to see what form of deposit prevails, whether the oxalates, uric acid, alone or combined, &c. From such an examination, frequently repeated, we gather information which will enable us to decide on very plausible grounds whether it be a stone composed of oxalate of lime, uric acid, urate of soda, alternated or mixed, &c.

4. From a knowledge of the kind of calculus, we are further led to know its *density*, and so its capability of being crushed. Phosphatic calculi are soft and friable, while uric acid and oxalate of lime are hard and dense—the mixed calculus intermediate, &c. By the note elicited on contact too with the sound, we gain further information on this point, as the sharp clear click of a uric acid calculus is very different from the muffled note emitted by a phosphatic concretion.

*Prostatic Calculus*, if very small, may give rise to no symptoms at all, or at least to none which are characteristic; but if large and numerous, then the influence their presence will have in setting up irritation at the neck of the bladder and impeding the discharge of the urine, may be so great as to attract the patient's anxiety. As the prostate gland is frequently hypertrophied when occupied by large concretions, the obstacle to the discharge of the urine, and also to free examination of the part, may be very considerable. A dull heavy pain in the perineum and neck of the bladder, with the rational symptoms of stone in that organ (or of tumour at the neck of the bladder), may be the signs by which a prostatic calculus announces its presence, and the distinction between the two affections is to be made by a manual examination of the prostate and bladder by means of the sound and the finger in the rectum. Frequent desire to micturate is a common sign, and the discharge of mucus by the urethra, and a semi-erect state of the penis, with difficulty in discharging semen, are more unusual symptoms of the condition now referred to. Prostatic calculi vary in size, from a pea to a hen's egg. The gland may be entirely destroyed by them, and they may even ulcerate their way into the rectum. They may be collected in numbers within cysts, connected with the gland, or lie embedded singly in its substance.

Fragments of calculi from the bladder present in the prostatic portion of the urethra are not to be confounded with those concretions which are developed in the prostate gland itself.

A calculus may lie wholly within the gland, or be placed partly in the gland and partly in the bladder. Disease of the bladder and kidneys, or stricture of the urethra, may be combined with calculus in the prostate, and will add their peculiar symptoms to those of that affection.

On passing a full-sized sound in the case of prostatic calculus, it will be found to grate over the surface of the stone or click against it, if it present a free surface to the canal; but if it is entirely encysted, this will not be the case, though an obstacle to the passage of the instrument may be observed. The sound of contact, if heard, will be produced when the instrument is at the prostatic portion of the canal, and not when it is in the bladder. By passing the finger into the rectum, and pressing it up against the sound, the pain will be intensified, and it may be made to assume a sharp prickling character. Hard, circumscribed bodies may be at the same time felt, especially if they lie on the rectal surface of the gland, or between it and the gut. During such pressure, too, the contact of the instrument with the stone will be rendered more evident. Sometimes, from a number of calculi being inclosed in a sac, a feeling of crepitation or attrition will be discovered on pressing by the rectum on the sound in the canal. If the stone is entirely encysted its recognition is very difficult, unless it can be felt per anum. Civiale recommends, in difficult cases, to use a soft bougie, which will retain the impress of the rough surface of the stone, and the groove which the calculus will make on its surface. But such markings may well be confounded with others impressed by irregularities in the canal, even supposing they are not obliterated or confused during withdrawal. If inflammation and abscess of the gland be caused by the calculus, then symptoms of such complication will take the lead, and possibly throw the others entirely into the shade.

CANCER. *See* TUMOURS.

**CANCRUM ORIS.**—This is a gangrenous affection of the cheek, which can hardly be confounded with any other malady. It attacks young children usually at the period of their first or second dentition, and that often during convalescence from some depressing ailment, especially if mercury has been largely administered. The cheek swells and becomes painful. The degree of pain, however, varies much, for while it is often very severe, it is at other times little complained of. The part gets glazed and waxy looking, having a central spot where the morbid action appears most intense. The mouth can hardly be opened, mastication is rendered very difficult, and the speech is impeded. It is especially in ill-fed children, living in cold, damp, overcrowded, and ill-aired apartments, that the affection is observed. It may be accompanied by low fever, or the constitution may show little excitement during its continuance. The buccal surface of the hard tumour ulcerates, and the cheek becomes perforated, sometimes with great rapidity, at other times more slowly. The sore which forms is a deep, irregular, sharp-edged, foul phagedenic ulcer, which spreads over the cheek, so as to cause terrible destruction and deformity. The saliva is profuse, and dribbles away, mixed with blood, pus, and shreds of tissue. There is a most offensive odour. The gum, when exposed, is found to be dark, tumid, and frequently ulcerated. The teeth get loose and fall out. The submaxillary glands enlarge, and abscesses may form in the cheeks, lips, or neck. The patient dies comatose.

**CARTILAGES** LOOSE IN THE JOINTS.—This term, although commonly employed, is by no means accurate, as the foreign bodies found within joints are not always cartilaginous, nor yet are they always loose, yet the phrase above used is one of common acceptance.

This is a rare affection in children. It may be met with in any joint, but is most commonly observed in the knee. These bodies vary much in size (from a pea to a chestnut), number (1 to 100), and shape. Their number is in inverse ratio to their size. Sometimes they are cartilaginous and partially ossified; sometimes fibro-cartilaginous, and occasionally they resemble masses of fibrine. They are supposed, in most cases, to be detached growths from the edges of the cartilage.

When these bodies occur in the knee-joint, they are chiefly found just outside of the patella, or on the inner and posterior aspect of the articulation, where they can be felt. They may be quite loose, and move freely about, or they may be more or less fixed by attachments to the synovial membrane. The articulation in which these bodies exist may, in appearance, be quite unchanged and healthy; or in consequence of the irritation which they cause, a state of chronic dropsy may arise, producing swelling and deformity.

The patient is sometimes quite aware of the presence of these foreign bodies in his joint, or he may be wholly unconscious of their existence till a sudden accession of pain and inability to move the joint imperatively attract his attention. At other times the dropsical condition above-mentioned, or the occurrence of other symptoms of chronic irritation, may be the earliest signs observed.

When these foreign bodies can be felt, they communicate to the hand a feeling of small, hard bodies, which, on pressure being applied, probably slip from the hand to conceal themselves behind a ligament or process of bone, again to reappear at the same or some other place at an uncertain interval. The patient himself, if conscious of their presence, generally discovers their position for the time being more easily than another can. The skin is unaffected over them, and they may or may not be combined with other disease in the joint.

Such bodies, if small or of such a size as hinders their passing between the bones of the articulation, may cause no annoyance whatever; but when symptoms of their presence do arise, it is commonly by a sudden uncontrollable pain of a very violent sickening character, sometimes sufficiently severe to make the patient faint. This pain occurs during walking, or after some sudden or special movement. The motions of the joint are restricted or annulled, and the patient may fall to the ground helpless. The paroxysm may pass off quickly, or become more intense and be followed by swelling and effusion. The cause of these phenomena has been supposed to be the loose body getting between the articulating surfaces—which they are the more apt to do in such an articulation as the knee—or the synovial processes within the joint getting nipped by the bones. It is only bodies of a certain size which can slip between the cartilages, and it will depend on their shape and mode of impaction with what facility they may get disengaged again. When the articulation is distended with fluid and the ligaments relaxed, this impaction is the more apt to take place; and the foreign body is the more difficult to be recognized when it lies loose within the joint. The acute attacks come on at irregular intervals; and though occasionally seemingly due to a blow, they most usually arise without any assignable cause.

The effects of foreign bodies in a joint may be confounded with idiopathic synovitis or rheumatism, especially with the former when the accident follows a blow; but the history of the case; the sudden mode of attack; the severity of the pain occurring all at once in a joint hitherto sound; the fixture of the limb; the absence of any inflammatory symptoms before the attack, and their rapid subsidence when the movement is restored (by the displacement of the offender); the probable knowledge the patient had of a movable body in the joint when he is questioned; it may be the previous occurrence of a similar though slighter attack; and there possibly being no injury at the moment to account for the symptoms; and, lastly, the discovery of a foreign body by tactile examination—will clear up the diagnosis. If the body, when felt on different occasions, always retains the same shape, then there is probably but one present; but if its physical characters change, and if on fixing one we can discover others, then there are sure to be several foreign bodies present.

**CHANCRE.**—Specific ulceration produced by the direct inoculation of the syphilitic poison. "The chancre springs from the chancre, and can alone reproduce it." "Syphilis springs from the chancre, and recognizes no other origin."

### PRIMARY VENEREAL ULCERS.

| **"Simple," "Non-infecting," Chancre. The "Chancroid," of Clerc, "Chancre mou."** | **"The Infecting," "Indurated," "Hunterian," Chancre.** |
|---|---|
| A purely local affection. | An ulcer followed by constitutional disease. |
| 1. *Rapidity of Evolution.* | |
| Evolution rapid (24 hours to 3 days after infection). | Slowly and insidiously developed (18 to 24 days, or later.) |
| 2. *Shape of Sore.* | |
| Round, if the tissues on which it is situated are homogeneous. If they are not, or if a solution of continuity has previously existed, or if folds or recesses are present in the tissue, or if two or more ulcers run together, then the shape may depart from this typical character. | The same. |
| 3. *Edges.* | |
| Clean cut, perpendicular, punched. Somewhat everted and undermined. Have a notched appearance under the lens. | Smooth, elevated, and of whitish colour, shining as if varnished. Looks as if gouged. The edges are gradually lost, melting into the floor, and being adherent and not undermined. |
| 4. *Floor.* | |
| Fretted, honeycombed, worm-eaten, irregular. | Smoother, somewhat glistening. Hollow, like an inverted cupola or cup. The centre gray, and darker than the rest. |
| 5. *Level.* | |
| Sunk below the surface. | Sometimes elevated above the surrounding parts. |
| 6. *Areola.* | |
| Reddish areola around the sore, sometimes violet, and of greater or less extent. | Seldom marked, in general no inflammatory blush around. |
| 7. *Painfulness.* | |
| Painful. | Painless, indolent. |

### 8. *Base.*

| | |
|---|---|
| Soft and pliant, or "phlegmonous," porky, dull, but not cartilaginous or bony. There is hardness and engorgement like that which exists in the base of a boil. It disappears with the inflammation and irritation on which it depends. It is most marked after the application of some irritant to the sore. | Indurated, succeeding the ulceration generally within one, or at most two weeks after infection, and usually surviving the ulceration for some time, it may be for years. It remains longest in those parts in which it has been at first most marked. This induration is certain evidence of the constitutional affection having begun. It is hard, cartilaginous, sharply defined, and elastic. It is usually hemispherical, or cup-like, its edges ending abruptly, and passing beyond (both below and around) the limits of the chancre. The degree of this induration varies with the tissue in which the sore is placed. It may be masked by inflammatory hardness, and it may be simulated by the effects of irritating applications, such as caustics. If it is placed in tissues which are not homogeneous it may be irregular in its shape, and it may lie wholly on the surface in some cases, and feel like a piece of parchment lying below and close to the surface. |

### 9. *Discharge.*

| | |
|---|---|
| The floor is covered by an adherent grayish false membrane, which is not removed by washing. A copious purulent discharge appears about the end of a week from infection, and when it is examined under the microscope after the addition of acetic acid, it is seen to consist of pus floating in an albuminous fluid. It is thin, rusty, ichorous, and very irritating during the period of progress, and thick and creamy when the sore is healing. | Scanty, serous, and ill-formed, sometimes gummy and sanious, *i.e.* if the sore has not been irritated. If, however, inflammation has become established in the chancre, water dressing must be applied for a few days, to allow it to subside, and then we can judge of the normal secretion of the sore. Under the microscope the secretion is found to consist of serum, lymph, and epithelial scales. |

### 10. *Inoculability.*

| | |
|---|---|
| Can be communicated to animals. Capable by inoculation of producing a similar sore in frequent repetition on the same individual. "Propagates itself with surprising fecundity." It is easily | Only inoculable on the human species. Seldom propagates itself on the same person spontaneously, unless during its early stage. Before any gland implication has occurred it is auto-inoculable. |

| | |
|---|---|
| propagated during the period of increase, and from its central portion almost up to its closure. It can be repeated any number of times on the same individual. "The nature of the chancre is in the pus which it secretes." | If it is artificially introduced, except at the period mentioned, it fails to produce any effect, or only causes a simple ulcer, which sore, however, in turn is capable of producing a hard chancre on a person previously unaffected. The typical sore can never be repeated on a person who has been once syphilized. |

### 11. *Number.*

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| Seldom single, most frequently multiple. | Usually solitary. |

### 12. *Site.*

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|---|---|
| Never occurs on the head. | May be found on any part of the body. "No region is exempt from it. It takes root in any soil." |

### 13. *Bubo.*

| | |
|---|---|
| The soft chancre is not necessarily attended by any bubo, and if it is so attended, the bubo may be either simple inflammatory adenitis ("sympathetic bubo"), or "a bubo of absorption." The former may end either in resolution or suppuration, and if in suppuration the pus is not capable of inoculation. The latter will *necessarily* suppurate, its pus is inoculable, and the open sore takes on specific action. These two species of bubo may be, and often are, coincident. The bubo follows this chancre at very variable periods. It has no fixed time of development, and may only occur late in the progress of the case, and disappear with or soon after the primary sore. There is usually only a single gland affected. It is mono-glandular. | Is inevitably followed by bubo, and that generally on both sides. "There can be no infecting chancre without an indurated symptomatic bubo." The glandular affection coincides or immediately follows the induration of the chancre, *i.e.* almost always within fourteen days. Several indolent, painless, hard, stony, rolling glands are found ("Pleiad"). The glands nearest the ulcer are first affected, and from these the morbid influence spreads to others. The skin and the surrounding tissues are unaffected. There is usually one gland more developed than the rest ("the anatomical or index gland of the pleiad"). There is no tendency to inflammation or specific suppuration. If injured or irritated, it may of course suppurate, like any other gland, but it never does so if uninterfered with. This hard bubo "belongs exclusively to the primitive ulcer of contagious nature," and it inevitably follows it. These indolent glands continue long after the disappearance of the chancre, and are the most constant and reliable indications of its character. |

### 14. *Lymphatic Vessels.*

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|---|---|
| Seldom affected, but if so, then it is with acute inflammation, followed by | Renders them usually (if they are at all influenced) hard, cordy, knotty, and |

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|---|---|
| abscess, and usually (not always) eventuating in the formation of a specific sore. | indolent. There is no acute inflammation, or fusion, or abscess, or pain. The plastic effusion leaves them movable and easily isolated. |

15. *Tendency to extend.*

| | |
|---|---|
| Tends to spread, and is frequently attacked by phagedena. | Has little tendency to spread. Soon reaches its limit, and is seldom affected by phagedena. |

16. *Duration.*

| | |
|---|---|
| This chancre, though more rapidly developed, is longest of healing as a rule (average 5 to 8 weeks). | Slow in its progress through all its stages (average four to six weeks), but heals steadily and quicker than the other. |

17. *Cicatrix.*

| | |
|---|---|
| A cicatrix without any peculiarity more than that following a common sore. | Leaves behind on a mucous surface usually a dark violet stain. "Slightly flattened, as if it had been formed in the thickness of the skin." When on a cutaneous surface, it leaves a round, *very persistent brown* or *bronze* stain, which is "the stamp of syphilis." |

18. *After consequences.*

| | |
|---|---|
| Not followed by constitutional disease. "It is a chancre without syphilis." A purely local affection. | "It is the exordium of syphilis." Constitutional symptoms appear within six months if not prevented by treatment. The period of its development being affected by constitution, temperament, health, the condition of the tissues, sex, age, &c. |

The hard base and the indolent bubo, then, are the characteristic and peculiar evidence of the infecting chancre. The simple chancre is much more common than the infecting. All are agreed on this point, though all are not at one as to the exact proportion which they bear to one another in practice. It may, however, be generally stated as about four to one. By a careful attention to the points above referred to, chancres may usually be distinguished. Occasionally, an herpetic eruption, or a simple excoriation, or an eczema, may cause a doubt; but in none of these, as a rule, have we any bubo, and the evidence derived from inoculation is always decisive. Herpes, too, begins as a group of small white vesicles set on a red base. When the vesicles disappear, *several* small *superficial* itchy weeping sores are found in a cluster. Their surface is not irregular, nor their edges elevated and abrupt, nor have they engorged or hard bases. They occur in delicate, fair-skinned persons, usually in constantly recurring crops; and are occasionally associated with derangement of the digestive organs. If a crust form so as to obscure the character of the sore, it should be removed, and then the true nature of the ulcer will be observed.

Simple excoriation appears early after exposure. There is no hardness. These sores are superficial, and do not penetrate far into the tissues. They have no attendant bubo, and heal easily under simple treatment.

Eczema seldom occurs in such a form as to cause any confusion between it and chancre. If it appears on the penis, it will usually be found on some other parts of the body as well. There is considerable local irritation, heat, redness, swelling, and pain. Scales form after the fluid of the vesicles has escaped or dried; and these, together with their accompanying little fissures, are characteristic.

CHOLESTEATOMATA. *See* TUMOURS.

**CHEST.** — A. **Wounds penetrating the Lungs from without.**—The symptoms observed will depend much on the severity and nature of the wound; on the freedom of its communication with the external surface; the depth of its penetration into the lung substance; and the character of the wounding agent.

In order to determine whether the lung has been wounded in obscure cases, we must take into account the relative position of the wounded man and his assailant; the kind of weapon used, and the mode of its employment; the extent of the blade inserted and its direction; yet for obvious reasons evidence is not always to be got from such sources; and when obtained, it is not always to be depended on, and our diagnosis must thus in most cases be founded on our examination of the patient alone. The use of the probe is reprehended by all surgeons in the investigation of these cases, and we no longer employ injections to determine the penetration or non-penetration of chest wounds.

It must at the outset be admitted that our means of determining the penetration or not of the lung substance, are not such as in all cases to put the matter beyond doubt; as though in many instances the combination of most or all of the following signs may occur, yet it frequently happens that no such association is found.

(*a*) *The shock* which attends these wounds may be very severe, if the lesion be extensive and deep and the bleeding free; but in many cases of penetrating wounds shock is little observed.

(*b*) *Hæmorrhage.*—If the lung be so pierced that a considerable blood-vessel is opened, then blood and air will be thrown out into the thoracic cavity; and will probably escape externally by the wound, unless it be small, oblique, or valvular. Frothy blood, too, will be expectorated in greater or less quantity, and that early in the case. If the wound is small and superficial, we may have no hæmoptysis, and we may have spitting of blood in cases in which there is no wound of the lung; still the coincidence of hæmorrhage by the wound and the mouth is a most valuable sign of injury to the lung. Mere hæmorrhage by the wound might be from the parietes; but if combined with hæmoptysis, it is most important.

Again, the blood may accumulate in the thorax, when its escape externally is prevented, and cause "Hæmathorax;" or gaining access into the cellular tissue, filter down into the dependent parts, discolouring the loins, and so producing a sign which was at one time thought to be pathognomonic of hæmorrhage into the chest, but which later experience has proved to be of but little value as evidencing such a condition. Such discoloration is very apt to be confounded with mere contusion of the part.

(*c*) *The escape of air* by the wound must be carefully observed. There being no escape of air does not prove that the lung is intact, nor does its occurrence always show that the viscus has been wounded. It may arise from the passing out of air previously drawn into the thoracic cavity during inspiration, and which has not come from the lung at all. If, however, the wound be carefully closed during inspiration, and yet air escape freely and repeatedly by the wound during expiration, then there can be little doubt but that it comes from the lung.

The air escaping from a wounded lung may cause emphysema of the lung itself, or gaining admittance into the cellular tissue, give rise to a like condition of the parietes, or even produce distension of the whole body by a mechanism afterwards to be considered; or lastly, it may fill the pleura and cause "pneumothorax." It is in those cases in which, with a narrow parietal wound, we have a free opening in the lung, that air is most apt to accumulate in the chest or cellular tissue. We have, on the other hand, emphysema of the parietes in cases where there is no penetrating wound and the lung is unhurt, and pneumothorax may be set up when the wound in the parietes is so valvular as to allow of the free entrance of the air during inspiration, but its non-escape during expiration. If the wound of the parietes is free, then emphysema will not occur.

(*d*) *Dyspnœa* is a symptom which is usually well marked in wounds penetrating the lungs. If the opening into the chest is free and direct, the lung will frequently collapse (not, however, necessarily), and then the respiration will be greatly interfered with — to an extent, in short, proportioned to the amount of breathing space cut off. If such collapse has occurred, or if blood has accumulated to any amount in the chest, then the respiratory murmur will be very feeble, or altogether absent—its disappearance being longest delayed along the side of the spinal column. The voice will be weak and the ribs fixed on the affected side. The pulse will be feeble, unsteady, and rapid, and the face anxious.

If the lung does not collapse in consequene of adhesions, or some such cause, and the wound is large, the movement of the viscus may be seen, and the air will enter and escape with an audible noise. The respiration, though laboured, will not be so severely compromised, and the respiratory murmur will be easily heard.

To these symptoms we must add, as being usually present, irritating cough, pain deeply fixed, and loud, rough, crepitant râles on auscultation.

The later symptoms are those of inflammation (pleuro-pneumonia), and effusion (air, blood, or pus), or the protrusion of a portion of the lung (pneumatocele).

It follows, then, from what has been said, that it is only by a combination of symptoms that in some instances we are able to conclude that the lung has been penetrated. In many cases the fact will be sufficiently evident; but in others it is only by observing the following points that we are able to judge:—

(1) Hæmorrhage by the mouth and wound.

(2) Air escaping during expiration by the wound, or into the cellular tissue, or into the thorax.

(3) Dyspnœa.

(4) Cough and pain.

(5) The evidence afforded by auscultation and percussion (as regards respiration, effusion, &c.).

(6) The progress of the case.

As a result of wounds of the lung we may have

B. **Emphysema of the Chest.**—This may arise in wounds penetrating the parietes only, or the parietes and the lung, or in injury of the lung without any wound of the parietes; or, lastly, from the giving way of some of the air-cells without any external injury.

The emphysema in some of these cases shows externally, and in some rare instances may distend the whole body when it gets access into the posterior mediastinum, and hence along the great vessels into the neck, and from there to the trunk and extremities; or it may fill the cavity of the chest to a greater or less degree, and produce the most serious symptoms, by compressing the lungs and displacing the heart. (See next page.)

When emphysema appears after a penetrating wound of the chest, we find an elastic, puffy, crackling swelling covered by unchanged or unusually pale skin. This tumour is compressible, but rises again so soon as pressure is removed; and it may be made to shift its position by pressure applied along the surface. The swelling begins in the lips of the wound, and spreads therefrom. It is most apt to occur in narrow oblique wounds, and may exist alone or combined with pneumothorax. If the amount of air accumulated is great, the pressure it exercises may impede the action of the lungs, and so produce more or less the symptoms of asphyxia. The blood being imperfectly aerated, the face and lips are livid and the pulse feeble and unequal; the sufferer cannot lie down, but retains an erect posture, or such a position as will assist his breathing most. The recognition of this affection is sufficiently easy.

C. **Pneumothorax,** resulting from penetrating wounds, may occur at an early period after injury, or at a late date in combination with the effusion of fluid into the thoracic cavity. When there is much air effused, inflammation arises and pus forms. It is in small oblique or valve-shaped wounds that this accident is most apt to occur.

The signs indicative of pneumothorax are oppression in breathing, especially on any exertion arising from the compression of the lung; inability to lie on the sound side; a large, rounded, and fixed condition of the affected side; respiratory murmur diminished or destroyed; voice feeble and percussion clear and tympanitic; and, finally, puerile respiration on the sound side. If there is fluid present as well as air, we may also have a metallic tinkle or amphoric resonance if the lung has been wounded.

D. **Empyema.**—In wounds penetrating the lung, not followed by rapidly fatal consequences, we may have an effusion into the chest of blood or pus.

All fluids poured into the cavity of the chest in quantity will give rise to certain rational and physical symptoms of their presence, while to these signs (common to both) others which are distinctive will be added in either case.

In all cases when the amount of fluid is considerable there will be

(1) *Dyspnœa.* The respiration will be embarrassed in proportion to the rapidity of the accumulation and the amount of the lung compressed. The breathing is short, laborious, and rapid.

(2) *The respiratory murmur* will be only heard at that portion of the lung which remains uncompressed. It will be puerile in the unaffected lung, and bronchophony will be frequently apparent; and if the amount of fluid is small, perhaps ægophony will be also observed. If adhesions prevent any particular part of the lungs from collapsing, then we may have the murmur there. If, however, the pleural cavity is filled with fluid, the respiratory murmur and voice sounds will be totally suppressed, and possibly the heart dislocated.

(3) *Percussion* gives a dull note up to the level of the fluid; and as in different positions this level varies, the dulness changes with it.

(4) *There will be much (generally) restless agitation and anxiety.*

(5) *A sense of weight and oppression* in the chest, and a dragging on the diaphragm.

(6) The *decubitus* is dorsal or on the affected side, or the patient remains in the semi-erect posture.

(7) The *thorax may be enlarged* and rounded on the affected side, the ribs being more horizontal than usual, and the intercostal spaces effaced or bulged. The side of the chest, too, is fixed. This bulging of the intercostal spaces is more common in purulent effusion than any other, and this has been so commonly observed, that some have even denied its occurrence in any other kind of effusion.

(8) *Blood or pus may escape* by the wound on coughing.

(9) *Splashing* ("hippocratic fluctuation") may be observed on sudden movement.

(10) *The hypochondrium of the affected side* will be more prominent than normal.

(11) *The abdominal organs* may be displaced and pushed downwards.

These symptoms may be produced by the presence in the chest of any fluid; but it is in the case of purulent effusions that they are most marked.

To be enabled to form an opinion of the nature of the fluid, we have the history of the case to guide us.

*Hæmorrhage* takes place generally, though not invariably, shortly after the receipt of the wound, and quickly increases;

while we have at the same time all the general signs present indicative of hæmorrhage, bloodless lips and face, paleness of the general surface, rapid diminution of the strength, tendency to fainting and collapse, cold extremities, small weak pulse, dilated pupils, &c. The anxiety and dread, too, are usually great; and we may have within a few days the infiltration of the loins with blood.

*Pus*, again, forms at a later date after hæmorrhage, or as a result of inflammation, or it may appear in the progress of phthisis from the bursting of an abscess; but in this last case the diagnosis will be evident. The formation of pus will be attended with rigors, hectic, and prostration. There will be emaciation and cough also, most likely, and, it may be, purulent expectoration. If it has followed a wound in the parietes or lung, we will have probably air in the upper part of the chest indicated by a clear note on percussion. The intercostal muscles may be so thinned as to allow the fluid to point, then an exploring needle may be used if necessary (which it very seldom is), but it should be avoided, unless preliminary to evacuating the fluid. An œdematous condition of the parietes on the affected side is common in empyema. If the cavity is half full of pus, and air also is present, then probably the metallic tinkle will be observed, and amphoric resonance too may be obtained. In pus collections "succussion" is best made out.

If the collection of pus be circumscribed, and point on the left side, the heart may communicate to it such a pulsation as to lead to the mistaken inference that we have an aneurism or malignant tumour to deal with; but the absence of the bruit and thrill of a vascular tumour, the history of its rise and progress, the evident fluctuation, and the results of percussion, will distinguish them.

E. **Pneumatocele** is a rare affection; but it may follow a penetrating wound of the chest, either immediately or at a later period, after the surface wound has cicatrized. It is generally at the side or front parts of the thorax that this tumour has been seen. It presents itself as an elastic, non-fluctuant, yet soft swelling. It is increased by cough and expiratory efforts. It recedes on suspension of the respiration, and on pressure applied to it during inspiration, and it can by pressure be kept reduced. The finger may on its disappearance make out the aperture in the parietes through which it passed. There is an impulse communicated to it on coughing; and on passing the hand over its surface, if the tissues are not much thickened, there will be a sensation of fine crepitation perceived. The percussion is clear, and the respiratory movement strong, especially during expiration. The skin over it retains its natural colour.

It is only with pointing empyema that pneumatocele can be confounded; but the former affection will be distinguished by the dulness on percussion, the absence of respiratory murmur and thrill, and the presence of fluctuation. If the collection contain both pus and gas, then an emphysematous crackle observed in such cases might mislead; but there will be, when such a tumour is reduced, a distinctive gurgling, which is not noticed in hernia of the lung.

An abscess external to the thoracic wall will have no impulse communicated to it by the cough, nor will it possess a vesicular murmur, and it cannot be reduced by pressure. Fluctuation, too, will be marked in it.

CLAVICLE. *See* FRACTURE and DISLOCATION.

CONCUSSION. *See* BRAIN and SPINE.

CORACOID PROCESS. *See* FRACTURE.

CORONOID PROCESS. *See* FRACTURE.

**CORD, SPERMATIC.** *See* GROIN for the diagnosis of hydrocele and hematocele of the cord.

*Varicocele* occurs very seldom before puberty, and is met with in the great majority of cases on the left side. It forms slowly and insidiously, and presents a tumour, which varies much in size; but which, when it is at all large, is of a pyramidal shape, the base being on the testicle, and the apex extending towards, and occasionally even into, the inguinal canal. It has no regular outline, is doughy and compressible to the touch, and feels knobby and irregular, as if worms or the intestines of a small animal were held in a bag between the fingers. Some of the enlarged veins are soft and empty, others hard and firm, and occasionally phlebolites may be distinguished in them.

Varicocele sometimes causes but little uneasiness; while in other instances (and these are most common) there is pain of a heavy, dull, dragging kind, confined to the testicle, or passing up into the groin, or round to the lumbar region. Occasionally the pain is very severe, and flashes in paroxysms up the cord. Sometimes the testicle is atrophied, and the patient suffers from seminal emissions and genital weakness, which in their turn beget a morbid state of the mind and a most distressing depression of spirits. The scrotum is pendulous and relaxed, especially on the affected side, and its skin is finer and more transparent and perspirable than normal. Sometimes the scrotum is eczematous, or the seat of an annoying pruritus. The sub-cutaneous veins, too, are occasionally distinctly enlarged. The tumour formed by varicocele is increased by being allowed to hang, as when the patient is in the erect posture, and also by all exertion and coughing which increases the quantity of blood contained in it. Pressing on the ring when the patient is standing, also renders the tumour more tense; and the prolonged application of heat, as by fomentations, increases its proportion; while the opposite conditions (viz. the horizontal posture, elevation of the scrotum, and the application of cold) diminish it.

The characters above described will at once distinguish this affection from all others.

(*a*) From hydrocele it is distinguished by the absence of a distinct smooth outline, elastic fluctuant feeling, and transparency. The peculiar wormy character of the tumour; the heavy dragging pain; the testicle being generally distinguishable, and often wasted; the nervous, depressed mental condition it so frequently produces when it is at all severe; the condition of the scrotum; the diminution of the tumour by recumbency and cold, and its increase by the erect posture, heat, and pressure on the ring—will all serve to differentiate it.

(*b*) From reducible scrotal hernia, especially omental hernia, the distinction is made by placing the patient in the recumbent position, and elevating the scrotum. The varicocele is thus emptied, and then the ring is carefully closed by the hand, and the patient made to stand. In varicocele the tumour will return as the arteries fill the vessels, but a hernia will not come down so long as the pressure is kept up on the ring. Again, if we compress the neck of the tumour, while the patient is erect, the varicocele will be enlarged and rendered tense, but the hernia is unaffected. Further, the sensation on handling the tumour is quite different; the wormy, irregular feeling of the one, and the firm, doughy, compact feeling of the other, cannot be confounded. Heat, too, applied continuously, as by a fomentation to the swelling when the patient is lying, will manifestly augment the varicocele, and leave the hernia unchanged. Lastly, if when horizontal the patient coughs, the tumour will be projected outwards at its lower end in epiplocele; but it will be drawn up—contracted towards the ring—in varicocele.

(*c*) Varicocele can hardly be confounded with the firm, resistent, globular swelling of sarcocele.

**DISLOCATION**, RECENT, IN GENERAL.—By dislocation is meant the more or less complete displacement from one another, of the articulating surfaces of the bones entering into a joint.

In examining a dislocation we are called on to substantiate, not merely its existence, but also its form, and the complications which may attend it. The consideration of the signs which mark its presence will alone be taken up here—the form and complications will be considered under each special dislocation.

A. **Deformity.**—The normal shape is lost. There are projections and hollows where none should exist, caused by the changed position of the articulating bones. The displaced bone may frequently be clearly felt in its new position, and its individuality verified by rotating the shaft to which it belongs, while the other hand is laid over it. This character of deformity, if marked, is in many cases quite distinctive of the accident. If the joint, however, is deep, and the parts covering it muscular, the deformity cannot be easily recognized. In dislocation of the bones forming the articulations which connect the limbs to the trunk, the deformity may extend to the trunk itself, and give a peculiar twist and attitude to the whole body.

**B. Loss of Function.**—(1) *Voluntary Movement.* The articulation cannot be used as formerly. Its normal movements are destroyed, partly by the disunion of the articulating surface, partly by the voluntary action of the muscles to avoid pain, and partly by the swelling and the displacement, and lost line of traction of the tendons.

Sometimes only certain movements are suppressed, and not others.

(2) *The communicated movements* also indicate the state of matters. The patient is best examined in this respect when under chloroform, so that his muscular resistance be annulled. If this precaution is not adopted we may be doubly misled in judging of the amount of motion we can produce in a joint, as the patient's voluntary power may give an erroneous fixity to an articulation, or by supplementing the movement with that of the neighbouring joint, give the appearance of motion which does not really exist. Under chloroform this source of disturbance and error is avoided. The surgeon fixes the proximal bone, and tries to move the distal, and so clearly recognizes the degree and direction of motion present. Sometimes, again, we will recognize certain movements as being possible in the altered relations of the joint which do not normally exist.

**C. Change in the Length.**—This, generally, is sufficiently evidenced to the eye, but by measurement we accurately determine it, taking care to set the trunk straight, the two limbs in a similar position, and to compare corresponding points on the two sides. It is seldom that the length of the part is not altered in dislocation—it is most commonly shortened for obvious reasons.

**D. Change of Axis.**—(1) *Long axis.* The limb lies as a whole in an abnormal relation to the trunk, and in a different axis from its fellow. If we follow with the eye the direction to its socket which the dislocated bone assumes, we will see that it passes to the side of that socket and not into it.

(2) *Rotation on its axis.* Very generally the dislocated bone

is more or less rotated outwards or inwards, the limb is frequently abducted or adducted, or flexed and fixed in that position. This occurs nearly always in the case of orbicular joints, and in the antero-posterior dislocations affecting the bones of the ginglymoid joints.

E. **Changed relationship** of the bony processes in the neighbourhood of the articulation. This is a most valuable sign, especially in the case of the elbow-joint. When the swelling is great it may be difficult to recognize these projections; but if firm pressure be made for a short time over them, their presence or absence can be recognized. By the use of acupuncture needles, Malgaigne and others have tried to distinguish the existence of bony projections when there was much swelling or muscle; but beyond telling that a piece of bone exists at a certain place and depth, we can gain from this method of exploration no information. The shape, size, &c., of the bone cannot be so determined.

F. **Crepitation.**—This is by no means always observed, and is seldom producible after a certain amount of inflammation has become established. It is apparent to the sense of touch, and occasionally also to the ear, and is caused when the bone is freely moved. It may be due to contact with neighbouring bones; but when it occurs late in the case, it is most likely caused by lymph effusion. (See p. 32.)

The following are accessory or assistant signs:—

(1) *Pain.* This will vary with the amount of violence which has accompanied the injury, and also, to some extent, with the articulation implicated, the formation of the articulation, the extent to which the bone is displaced, and the sensitiveness of the individual. It is usually excited at the moment when the accident has been sustained, and continues till the bone is replaced or the parts have become accustomed to the pressure. It is due, in the first instance, to the tearing of the tissues surrounding the joint, and afterwards to the pressure on neighbouring parts. A feeling of coldness and numbness in the limb is also sometimes complained of, due to pressure on the blood-vessels and nerves.

(2) *Swelling.*

(*a*) This may be very considerable, and due to inflammatory effusion.

(*b*) Change of circumference in the case of the limbs. If the limb is shortened, the muscles are drawn up, and so the girth of the part is augmented; while, on the other hand, if it is lengthened, the muscles are put on the stretch, and its circumference is somewhat diminished. The whole limb may swell, and become œdematous, from the effects of the pressure on the blood-vessels.

(3) *Discoloration.* This may be great when the dislocation has been produced by direct violence. In some cases it will be found present at a distance from the joint (at the end of the lever) where the blow was sustained.

The practised eye quickly comes to recognize the peculiar physiognomy of each dislocation; but in obscure cases much care is requisite to avoid error. Sometimes an examination of the clothes even of the patient may be useful, as showing where he was struck. It may be proper to know whether any deformity, congenital or acquired, pre-existed in the part (chronic disease, old fracture, change of direction and form of the head of the bone from natural causes, &c.), what attitude the patient was in when he met with the accident, of what nature and degree, and acting from what direction, the dislocating force was, and where it was applied, and what were the immediate symptoms produced. It is most requisite to compare the corresponding parts on either side of the body, and in doing so to place both in the same relative position;—to study the attitude of the patient, and the relationship of the limb to the trunk, and the one part of the limb to the other parts of itself. We examine the length, shape, axis, mobility (voluntary and communicated), we palpate the articulation, and carefully compare its projections and hollows with those in the corresponding sound joint; and in this way we come to form an opinion of the case. Lastly, when reduction has been accomplished, all the signs alluded to disappear, except perhaps some degree of discoloration, and uneasiness and swelling.

Dislocation has been confounded with fracture in near proximity to a joint, also with sprains and contusions, with disease such as white swelling, with anchylosis, exostosis, and other tumours.

It is only with the two first that recent dislocation can be confounded.

From fracture near a joint, dislocation is distinguished thus:—

| FRACTURE. | DISLOCATION. |
|---|---|
| 1. *Deformity.* | |
| Not in the joint but a short distance from it. A comparison of the corresponding joints will make this evident. The deformity, too, is slighter; it varies in degree and place, and is easily removed. The projection felt is smaller, and more irregular in shape. The fragments frequently take a different position from that assumed by the head of the bone when it is dislocated. | It is great, and is placed at the position of the joint. It remains the same in place and degree, and is only removed by reduction. The outline of the head of the dislocated bone can frequently be made out. The projection of the bone perceived is in the usual position which experience tells us the bone assumes in dislocation. |
| 2. *Mobility.* | |
| Augmented in *degree*. It is not always of the *kind* that exists in the articulation near which the fracture lies, and not at the same *level* as the joint. Attempted movements are different from those normal to the articulation. | Natural movements of the joint decreased or abolished. |
| 3. *Length.* | |
| Never lengthened (at least so rarely as hardly to affect the rule), usually shortened. | Occasionally lengthened. |
| 4. *Axis.* | |
| In fracture the limb frequently lies close to the middle line. | In dislocation the limb stands out, and cannot, or only with difficulty, be brought to the middle line. |
| 5. *Reduction.* | |
| Easy, but displacement apt to recur after the extending force is removed. | Difficult, but once effected, displacement is not apt to recur. |
| 6. *Bony Processes at the Articulation.* | |
| Retain their relationship to one another. | Lose their relationship. |
| 7. *Crepitation.* | |
| Immediately present, and easily produced, a fine dry grating, which is quite characteristic. | Very seldom observed till a late date, and then it is more a rubbing than a crepitation. |

8. *Pain.*

| | |
|---|---|
| Seldom severe if the part is kept at rest, and it continues after reduction. | Generally severe though part at rest, but is relieved by reduction. Numbness greater than in fracture. |

9. *Discoloration.*

| | |
|---|---|
| In deep and frequently in dependent parts after some days. | Slight, superficial, and upon the part struck. |

10. *Sound on Reduction.*

| | |
|---|---|
| Reduction effected without any sound. | A distinct snap when the bone is restored to its socket. |

Finally, a fracture may put on the features of a dislocation; but a dislocation very seldom simulates a fracture. *If in any case the distinction cannot be made, the rule is to treat the case as a fracture.*

From sprains and contusions the distinction is to be made by observing that the deformity is different. The swelling, in contusion, is more diffused, and often confined to, or more marked on, one side of the joint, and it consists only of the soft parts. There is no bone projected abnormally and raising the tissues, hence the look and character of the swelling is different in the two cases. In contusion it is more even, more rounded and regular in outline, and not so hard.

Further, the movements of the joint in sprain are more painful and difficult than physically impossible. Under chloroform, the degree of mobility can be best determined when the influence of pain in restricting movement is obviated. The function is not so completely lost in sprain. The patient often walks some way after the accident. There is no change in the length of the limb, and the processes retain their relationship to one another.

Lastly, ecchymosis is frequently differently placed in sprain from what we would expect it to be in a case of dislocation. If the joint is deep, and the swelling great, we may not be able accurately to determine this point for some days.

OLD DISLOCATIONS.—In these cases, after the usual pathological changes have taken place which follow the accident, there will be the alteration of contour in the joint; the bony processes in the neighbourhood of the articulation will have lost their accustomed relationship; the function of the joint, though wonderfully restored, is much weakened; its movements are less powerful, less precise, and less extensive, than they should be; and the motion which exists is much due to the supplemental action of the neighbouring articulations; and the limb—especially that portion of it immediately distal to the injured articulation—will be wasted. If the accident has occurred in early life, the member will most likely hang powerless and undeveloped.

The distinction between old dislocations and diseases of the joint (especially chronic rheumatic arthritis), or tumours, or anchylosis, is derived mainly from the history of the case, its invasion and progress; by observing the presence of those signs of dislocation which have been above dwelt upon, and the absence of those other symptoms which are indicative of the various maladies alluded to.

### SPECIAL DISLOCATIONS.

LOWER JAW.—This only takes place forward. It may be unilateral or bilateral, and is caused by spasmodic contraction of the depressor muscles of the lower jaw; or from blows received on the chin, the mouth being open.

Signs of recent *bilateral* dislocation. Separation more or less complete of the teeth, the lower being in advance of the upper. There is projection of the chin, and the cheeks are flattened, thus producing a characteristic expression. A void exists in front of the ear, and the coronoid process is felt on the cheek below the malar bone. There is fulness in the temporal fossa, between the eyebrow and the ear, immediately above the zygoma, from displacement of some of the fibres of the temporal muscle. There is rigidity and prominence of the masseter muscles. Saliva dribbles from the mouth; the throat is dry. Mastication and deglutition are difficult. Articulation, especially of the labials, embarrassed.

In *unilateral* dislocation, the signs will be confined to one side, and not be so pronounced. The face is turned to the sound side. The prominence of the coronoid process on the cheek is even more evident than in bilateral dislocation. The annoyance and embarrassment are much less than when double dislocation has taken place. The hollow below the ear is not so evident.

In *congenital* dislocation of one of the condyles of the lower jaw, the movements of the mouth are little interfered with; there is projection of the upper teeth beyond the under; there is no unusual amount of salivation, nor fulness in the cheek. The one side of the face is longer than the other, and there is a twist in the entire features.

In *chronic rheumatic arthritis* of the temporo-maxillary articulation, the disease comes on slowly; there is constant pain in the articulation, aggravated by atmospheric changes, and there is embarrassment in the functions of the joint. It is usually bilateral, and occurs mostly in the old. In many cases the enlarged condyle can be distinctly felt below the zygoma, in front of the external meatus. There may be enlargement of the glands behind the ear and over the parotid. The face gets distorted, and the lower teeth project.

HUMERUS.—The complete dislocations of this bone, though admitting of much refinement and subdivision, chiefly according to the extent or distance it is carried from the glenoid cavity, are reducible to three main forms.

Downwards and inwards into the axilla (of this the "sub-glenoid" and "sub-coracoid" are varieties).

Forwards and inwards ("sub-clavicular" of Malgaigne and "intra-coracoid" of Nelaton come under this designation).

Backwards and downwards ("sub-acromial" and "sub-spinous" of Malgaigne).

In all dislocations of the humerus we observe—

(*a*) Flattening of the shoulder.

(*b*) Projection of the acromion process.

(*c*) Hollow immediately below the acromion, in the position of the glenoid cavity.

(*d*) The head of the bone in an abnormal position.

(*e*) The length of the upper arm usually altered.

(*f*) The axis of the humerus changed.

(*g*) The motion (voluntary and communicated) of the articulation impaired.

(*h*) The elbow in an abnormal position.

(*i*) Pain, especially on movement.

DISLOCATION DOWNWARDS AND INWARDS.—Caused by a fall on the elbow or hand, when the extremity is removed from the side at or beyond a right angle. Occasionally it is produced by direct blows on the upper part of the humerus, the elbow being supported. The appearance of this form of dislocation is generally very characteristic, from the flattening of the shoulder, the projecting elbow, and the powerless arm, commonly supported on the hip, the head and neck of the patient being inclined to the injured side, &c.

A. **Deformity.**—Roundness of the shoulder gone—it is sunk. The acromion projects and immediately below it a hollow exists, where, if the patient is emaciated, the outline of the glenoid cavity can be recognized. The anterior wall of the axilla is lengthened, and perhaps distended by the round head of the bone, which can be felt in the axilla lying generally high up, especially if the arm is carried from the side. The head of the bone rotates with the shaft. The head is inclined to the injured side.

B. **Loss of Function** is marked. There is almost no voluntary motion; and when movement is communicated, the arm can be carried outwards, but only with difficulty and pain, towards the body. Antero-posterior motion is sometimes tolerably free. The hand of the injured arm cannot be placed by the surgeon on the opposite shoulder, while the elbow lies close to the chest.

C. **Length.**—By carefully measuring the upper arm it is found to be slightly lengthened. Occasionally it is normal, and more rarely it is a little shortened.

D. **Axis.**

(*a*) The long axis of the humerus is directed from a point below the glenoid cavity outwards and backwards. The elbow is removed from the side, and carried backwards, and hence often rests on the hip. It cannot generally be brought to the side; or if so, it is with difficulty and pain, and by the patient depressing the shoulder when the attempt is made.

(*b*) Rotation of the forearm slightly inwards (outwards more rarely), and slightly flexed.

E. **Relationship of Bony Processes.**—The upper part of the shaft loses its relationship to the acromion and coracoid processes.

F. **Crepitation** sometimes apparent.

G. **Accessory Signs.** (*a*) *Pain* considerable from pressure on the axillary nerves, numbness of the fingers, and coldness of the hand.

(*b*) *Swelling* (α) of shoulder and hand (œdema) also frequently present. (β) Circumference of shoulder over the acromion and under the axilla increased.

(*c*) *Discoloration.*—Frequently ecchymosis at the inner side of the arm.

In the sub-coracoid variety of this dislocation the signs are less marked, especially the presence of the head of the bone below the articulation, than in the form of complete dislocation into the axillary space.

There are two affections with which this accident may be confounded—Fracture of the upper end of the humerus; and dislocation of the clavicle upon the acromion.

1. Distinction between the dislocation under review and fracture of the upper end of the humerus.

*Mode of fall.* If with the arm out from the body, and upon the hand or elbow, then we have probably dislocation to deal with. If the arm has been close to the side, and the fall has been upon the shoulder, then it is likely to be fracture. If ecchymosis be present, it will probably be on the inner side in dislocation, and on the outer side (and more frequently present) in fracture.

| **Dislocation into the Axilla.** | **Fracture of the neck of Humerus.** |
|---|---|
| (*a*) *Depression at the shoulder.* | |
| Immediately below the acromion, and well marked. | It is placed at a short distance below the acromion, according to the extent of the head of the bone which remains in the socket, and is less decided. |

(*b*) ***Projection of the acromion.***

| | |
|---|---|
| Pointed and evident. | The projection is not the acromion alone, but that process combined with the upper fragment of the bone. |

(*c*) ***Body felt in axilla.***

| | |
|---|---|
| The large, round, regular head of the bone lying generally high up in the axilla. | Irregular in shape, and not thrust high up into the space. |

(*d*) ***Reduction.***

| | |
|---|---|
| Difficult, and usually remains. | Easy, but soon reproduced if the force is removed. |

(*e*) *Crepitation.*

| | |
|---|---|
| Seldom present. If it does occur it is at a different period of the case, and is of a different character. | Evident when fragments brought into contact. |

(*f*) ***Position of the elbow.***

| | |
|---|---|
| Removed from the side, and cannot without difficulty and pain be approximated. | Little removed from the side, and can be easily approximated. |

(*g*) ***Length.***

| | |
|---|---|
| Slightly increased. | Shortened. |

(*h*) ***Motion.***

| | |
|---|---|
| Voluntary lost, and communicated movement very limited. | Voluntary lost, but communicated movements free under chloroform. |

It may be also added that the anterior fold of the axilla is more prominent in dislocation than in fracture, being bulged by the head of the bone.

Dislocation of the clavicle above the acromion.

This error has been made, and yet seems hardly possible. It has been due to the sharp projection of the acromial end of the clavicle above the shoulder, but then beneath this projection the acromion will be found with the roundness of the shoulder below it again; and there is no bone in the axilla, nor are any of the signs of dislocation, except the impaired function of the arm, observed.

DISLOCATION FORWARDS AND INWARDS in the subscapular fossa, or below the clavicle. The head of the bone lies usually on the second and third rib under the pectoralis. This dislocation results from falls on the shoulder or elbow (when it is inclined backwards), by which the head of the bone is projected in front.

DISLOCATION BACKWARDS AND DOWNWARDS. Generally between infra-spinatus and teres minor. It is a rare accident, and is caused generally by falls on the elbow when it is inclined forwards in front of the chest. The signs will vary with the extent of the displacement.

**A. Deformity.**

*Dislocation forwards.*—There is projection of the acromion, and a hollow below it, which is more evident behind than in front. There is a projection of the round head of the bone (which rotates with the shaft), below the clavicle, or nearer the axilla, below the pectoral. Sometimes when the head of the bone passes below, and to the inner side of the coracoid process, the great tuberosity is broken off and remains opposite the glenoid cavity, partially filling it up, and so rendering one of the signs of dislocation, viz. the hollow below the acromion, less marked than usual.

*Dislocation backwards.*—Acromion and coracoid process very prominent—parts tense over the former and the anterior portion of the latter. Depression below acromion. Head of bone can be felt behind the shoulder. It rotates with the shaft. It may lie below the inferior angle of the acromion, or below the spine of the scapula.

**B. Loss of Function.**

*Dislocation forwards.*—Voluntary motion very limited, and when communicated the arm cannot move outwards or forwards, but can backwards.

*Backwards.*—Motion not so impaired as in the other forms of dislocation. Motion of arm backwards very restricted.

In neither case the hand can be laid on the sound shoulder by the surgeon, while the elbow lies close to the chest.

**C. Length.**

*Forward.*—Arm shortened.

*Backwards.*—Arm unchanged or lengthened.

**D. Axis.**

*Forward.*—Elbow carried backwards and separated from the side.

(*a*) Long axis. To the inner side of the acromion process, or middle of the clavicle.

(*b*) Rotation inwards.

*Backwards.*—Elbow carried forwards and from the trunk, and cannot be approximated or made to lie close to the side.

(*a*) Long axis from behind the glenoid cavity, obliquely across the trunk. (*b*) Rotated inwards, and the fore-arm flexed.

**E. Changed relationship of Processes.**

*Forward.*—Relationship of the head of the bone changed to the acromion and to the coracoid process.

*Backwards.*—Relationship of the head of the bone changed to the acromion and spine of scapula.

**F. Crepitation.**—Crepitation may be present in both.

**G. Accessory Signs.**

(1) *Pain* not considerable in backward dislocation, unless on motion, but generally severe in dislocation forwards.

(2) *Swelling.*—(*a*) Not usually marked, unless great bruising in either case. (*b*) Increase of circumference in both.

*Paralysis of deltoid*, from violence, has been confounded with dislocation of the humerus, as there is frequently flattening of the shoulder and projection of the acromion, together with loss of motion in certain directions; but the distinction is made, by observing that the head of the bone is in its place in simple paralysis, and that all communicated movements are free under chloroform. The violence, too, in such cases has been applied directly to the deltoid, as in falls on the shoulder (the arm being close to the side); a stroke with a stick, &c.

In any case, then, of dislocation of the humerus, and in order to distinguish its form, we chiefly pay attention to—

(*a*) How the patient fell or was struck.
(*b*) The position of the head of the bone.
(*c*) The position of the elbow.
(*d*) The axis of the arm.
(*e*) Length of the limb.
(*f*) Movements voluntary or communicable.

In reviewing the three chief forms of dislocation of the humerus, before referred to, we notice with regard to—

(*a*) **Mode of Fall.**

1. (Into axilla). Fall on the hand or elbow, when it was removed from the body, or a direct blow downwards on the upper part of the humerus.
2. (Forwards and inwards). Fall on shoulder or elbow when it was inclined backwards.
3. (Backwards and downwards). Fall on the shoulder or the elbow when it was advanced.

(*b*) **Position of the head of the Bone.**

1. In the axilla.
2. Under the clavicle, or to the inner side of coracoid process.
3. On the back of scapula.

(*c*) **Position of the Elbow.**

1. Away from the body, and carried slightly downwards. Cannot be brought to the side.
2. Backwards and outwards from the body.
3. Forwards and away from the trunk. Cannot be brought to the side.

(*d*) **Axis of Arm.**

1. From below the glenoid cavity downwards, outwards, and slightly backwards.
2. From before the glenoid cavity downwards and backwards.

3. From behind the glenoid cavity, downwards and forwards, obliquely across the trunk.

(*e*) **Length.**

1. Usually increased.
2. Diminished.
3. Unchanged or increased.

(*f*) **Motion.**

1. Abduction and antero-posterior movements continue, but abduction lost.

2. Backward movements exist, but neither abduction nor forward movement.

3. Motion more free than in the other forms of dislocation. Movement backwards, and abduction most difficult.

## BONES OF THE FORE-ARM.

1. Both bones. (*a*) Backwards; (*b*) forwards; (*c*) outwards; (*d*) inwards; (*e*) ulna backwards and radius forwards.

(*a*) Is most common, and may be combined with fracture of the coronoid process; (*b*) very rare, without fracture of the olecranon; (*c* and *d*) very seldom complete; (*e*) not common.

2. Ulna alone. Backwards.

3. Radius. (*a*) Backwards, very rare; (*b*) forwards, most common; (*c*) outwards.

Complete dislocation alone is considered here; incomplete presents the same features, only in a less marked degree.

Dislocation of both bones backwards most usually results from violent falls on the palm of the hand, or a blow on the upper part of the forearm, especially if the humerus is fixed.

A. **Deformity.**—Olecranon projects markedly behind, where it is on a higher level than the condyles. Its prominence is increased on trying to flex the arm, and diminished on extension. The triceps is relaxed and prominent, becoming more so when the fore-arm is straightened. To the outer side the cup-like end of the radius may be distinguished when pressure is made by the finger, and it can be felt to rotate with the fore-arm. In front of the flexure of the joint, and deep in its hollow, the lower end of the humerus can be found, and the tendons of the brachialis anticus and biceps are stretched over it. The antero-posterior diameter of the articulation is increased. The lower and back part of the arm is rendered somewhat concave, in place of being convex. The fingers are somewhat bent.

B. **Loss of Function.**—The function of the joint is destroyed.

(*a*) Little or no voluntary movement.

(*b*) Very difficult to communicate any extension or flexion to the fore-arm; but a lateral movement (not existing in the normal articulation) can be produced if the patient is seen early. Supination is possible; but pronation is impossible, or very difficult. The fore-arm and hand are usually fixed in a state of supination.

C. **Length.**—The fore-arm is shortened in front, and of normal length behind. The length of the upper arm is unchanged.

D. **Axis.**—(*a*) Fore-arm bones slightly flexed on the humerus (in rare cases the arm is straight). (*b*) Supinated.

E. **Relationship of Processes.**—Olecranon and head of radius retain their relationship to one another; but both have lost their relationship to the condyles of the humerus.

F. **Crepitation.**—Sometimes marked after a time.

G. **Accessory Signs.**—(1) *Pain* very considerable, sometimes from injury of the ulnar nerve, and then there will be numbness of the two outer fingers.

(3) *The swelling* is frequently very great, and sets in early, so that the examination of the part is rendered very difficult without the use of chloroform.

(3) *The circumference* of the joint is markedly increased.

If, as is frequently the case, the coronoid process is broken when the bones are dislocated, then there will be decided mobility at the joint, and crepitation when the fore-arm is drawn forward.

*The incomplete dislocation* is distinguished from the complete by the length of the fore-arm being little changed, by the absence of any lateral movement at the joint, by the absence of the same prominent projection of the olecranon behind and the humerus in front. The olecranon is not above the level of the condyles, and the cup-like head of the radius cannot be felt behind clear of the articulating surface of the humerus.

*From mere contusion* the distinction is easily made. The deformity is not the same. The swelling may be great, but the abnormally placed projections of the bones are not felt below the swelling of the soft parts. The joint (under chloroform) is not so fixed, and its movements can be effected by the patient, though they produce pain. The length of the forearm is unchanged, and it is in a natural position.

*From fracture of the lower end of the humerus* this dislocation is distinguished by the following points:—

1. *Cause.*—Dislocation: A fall (usually) on the hand, the fore-arm being extended.

Fracture: A fall on the elbow.

2. *Bony projections* in front.

Dislocation: The projection of the humerus in front is large and broad, and lies *below* the plait of the articulation.

Fracture: That in front is smaller and more irregular than the articular end of the humerus, and it lies not so deeply in the bend of the elbow, being shorter.

3. *Bony projections behind.*—Dislocation: The outline of the olecranon and the head of the radius are felt on palpation.

Fracture: Large, not having the outline of the olecranon alone, but that of the condyles also, and being pushed higher up the arm.

4. *Relationship of Processes.*—Dislocation; Relationship of olecranon and radius to the condyles of the humerus lost. On the anterior and inner side of the joint the sharp edge of the trochlea may be felt, with the epitrochlea above it.

Fracture: Relationship of the olecranon and radius to the condyles of the humerus retained, but these last have lost their connection with the shaft of the humerus, and move independently of it.

5. *Motion.*—Dislocation: Joint fixed, or with difficulty movements communicated.

Fracture: Movement easily communicated.

6. *Crepitation.*—In dislocation, absent or of a different character.

In fracture marked.

7. *Length of the shaft of the Humerus.*—Dislocation: Unchanged, if carefully measured from the acromion to the lower end of the bone.

Fracture: Shortened.

8. *Reduction.*—Difficult in dislocation, but remains if not accompanied by fracture.

Fracture: Easily obtained, but easily reproduced.

DISLOCATION OF BOTH BONES FORWARDS.—This is very rare without fracture of the olecranon.

A. **Deformity.**—The condyles project, and beneath them there is an abrupt hollow or transverse groove. The parts in front are tense and stretched. The normal projection of the olecranon behind is absent.

B. **Loss of Function.**—The fore-arm can be extended by the surgeon; but the patient hardly impresses any movement on it. The fore-arm may be even bent somewhat backwards by the surgeon, and then the coronoid process and the head of the radius may be felt in front of the articulation.

C. **Length.**—Fore-arm lengthened.

D. **Axis.**—Slightly flexed or extended.

E. **Relationship of Processes.**—Olecranon and condyles have lost their relationship. The head of the radius is separated by a space from the outer condyle.

F. **Crepitation.**—Absent if there is no fracture.

G. **Accessory Signs.**—*Pain* and *swelling* usually considerable. The circumference of the joint is diminished.

If the olecranon is broken, then the mobility is great, and the separated process can be felt behind.

DISLOCATION OUTWARDS.—Lateral dislocation. This is very seldom complete. In incomplete dislocation, all the signs noted below will be less distinct and characteristic.

In lateral displacements, the force may be applied above and below the joint in different directions at the same time, the humerus being driven in one way, while the fore-arm bones are thrown in the other.

A. **Deformity.**—In complete dislocation outwards, the transverse diameter of the joint is much increased; and if there be (as there often is) a backward displacement at the same time, the antero-posterior diameter will be also augmented. Behind, and to the inner side, the characteristic surface of the lower end of the humerus will be apparent to the touch. The inner condyle projects markedly with an abrupt void below it; and if there be also posterior displacement, the anterior and inferior portion of the outer condyle may also be felt in front. The cup-like head of the radius projects externally, and its outline is made more marked by rotation. The olecranon, too, lies to the outside of the humerus. The flexor and extensor muscles are very tense.

B. **Loss of Function.**—(*a*) Voluntary movements very restricted, but (*b*) the communicated movements of pronation and supination are retained, while flexion and extension are very difficult and painful.

C. **Length.**—Somewhat shortened (fore-arm).

D. **Axis.**—(*a*) The long axis of the fore-arm bones is to the outside of the line of the humerus. (*b*) The fore-arm is bent, pronated, and so twisted, that the posterior surface appears to be external, and the anterior internal.

E. **Relationship of Processes.**—The relationship subsisting between the processes of the fore-arm bones and those of the humerus is lost; but that between the fore-arm bones themselves remains.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—*Pain* and *swelling* and *discoloration* generally marked. The circumference of the joint much increased.

DISLOCATION INWARDS.

A. **Deformity.**—Lateral diameter much increased. The outer condyle of the humerus projects markedly, and has an abrupt hollow below it. The olecranon lies to the inner side of the joint, being either on a plane with the condyles or behind them. The head of the radius lies in the bend of the elbow, sometimes projecting forwards.

B. **Function.**—(*a*) Voluntary motion very limited. (*b*) Supination and pronation communicable, but the other movements very difficult and painful.

C. **Length.**—Shortened, if any backward displacement, as there frequently is.

D. **Axis.**—(*a*) Long axis. To the inner side of the humerus. (*b*) Fore-arm slightly bent, and markedly pronated (rarely supinated).

E. **Relationship of Processes.**—Lost.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—*Pain*, *swelling*, and *discoloration* often marked. The circumference of the articulation increased.

DISLOCATION OF THE ULNA BACKWARDS AND RADIUS FORWARDS.—Caused by falls on the hand, accompanied by a severe twist.

The signs are a combination of those noted under dislocation of the ulna backwards, and that of dislocation of the radius forwards (which see). The fore-arm and hand are twisted inwards and slightly flexed. All motion is lost. The transverse diameter of the joint is diminished, while the antero-posterior is much augmented.

DISLOCATION OF THE ULNA ALONE BACKWARDS.

A. **Deformity.**—The signs are much the same as those present when both bones pass behind the humerus, only the head of the radius can be felt in its place, or but little removed from it—its position being defined when the bone is rotated. There is a marked hollow at the inner side of joint where the ulna should be.

B. **Function.**—Supination and pronation remain. Flexion and extension are difficult and painful.

C. **Length.**—The ulnar side of the fore-arm is shortened, while the radial remains unchanged.

D. **Axis.**—Both the fore-arm and the hand are somewhat flexed, and the former is turned inwards.

E. **Relationship of Processes.**—The relationship of the head of radius is little, if at all, changed; but that of the olecranon is quite lost.

The antero-posterior diameter of the inner portion of the joint is augmented and the circumference increased.

If the coronoid process is broken, then the mobility of the joint is considerable, and crepitation is apparent on making extension.

Dislocation of the radius backwards is very rare. It is caused by a fall on the hand, while the fore-arm is forcibly pronated, or during forced pronation and extension combined, or when a sharp blow is sustained on the upper and anterior portion of the bone driving it backwards.

A. **Deformity.**—There is a depression in front under the outer condyle, and the cup-like head of the radius is felt behind rotating under the finger. The shape of the joint at its outer part is changed. The tendon of the biceps is tense.

B. **Function.**—Supination lost, or incomplete and painful. Flexion more difficult than extension.

C. **Length.**—Unchanged.

D. **Axis.**—(*a*) Long axis. Fore-arm semi-flexed. Hand and fingers frequently slightly bent. (*b*) There is pronation, and the arm is turned outwards.

E. **Relationship of Processes.**—That between the head of the radius and the external condyle of the humerus is changed.

Dislocation of the radius forwards.—This is the most common of the single displacements of the radius. When the hand is carried forcibly backwards, the arm being supinated, or when a sharp blow has been struck on the bone at its upper and back part, this dislocation may occur.

A. **Deformity.**—The outer side of the fore-arm is somewhat shortened and raised. The joint is round and not flat. The round head of the radius can be felt in front of the articulation rotating under the hand, and there is an unusual hollow behind below the external condyle. The tendon of the biceps is relaxed.

**B. Function.**—Flexion beyond a right angle (or a little more) is impossible. Fingers cannot be made to touch the shoulder. Pronation is free, and supination very painful. Extension free, but if the dislocation is complete it is painful.

**C. Length.**—Slight shortening of the outer border of the forearm.

**D. Axis.**—Fore-arm slightly bent, pronated, or semi-pronated.

**E. Relationship of Processes.**—Those of the ulna retained, and those of the radius changed.

**F. Crepitation.**—Not present.

The pain is not great, nor is the swelling or discoloration usually marked.

DISLOCATION OF THE RADIUS OUTWARDS.

**A. Deformity.**—Projection of the supinator longus in front of the radius, and internal to the luxated head of the bone. This projection insensibly loses itself below in the forearm. Projection of the round, cup-like head of the radius on the outer side. It rotates under the finger externally to the outer condyle. The breadth of the joint is increased.

**B. Function.**—Supination impossible. Pronation, extension, and flexion remain.

**C. Length.**—Outer side of the arm somewhat shortened.

**D. Axis.**—Fore-arm usually between pronation and supination, and so twisted.

**E. Relationship of Processes.**—Head of radius has lost its relationship to the external condyle and to the olecranon.

*Pain* and *swelling* and *discoloration* not usually great, but the circumference of the joint is slightly increased.

In examining any case of dislocation of the bones of the fore-arm, from the humerus, in order to determine the precise nature of the displacement, we should observe—

1. How the patient fell or was struck.
2. What change exists in the diameter of the joint (antero-posterior or lateral).
3. What is the direction of the axis of the bones of the fore-arm. Is it to the back, or front, or side of the humerus, the axis of which bone it is easy to fix?
4. What movements can the patient execute, or the surgeon communicate to the joint.
5. The characters and exact position of any bony projections in front, behind, or to the side of the joint.
6. The relationship to one another of such projections—the radial and ulnar to one another, and to the humerus.
7. Position and nature of any abnormal hollow.
8. Length of the fore-arm; and if any change in it, observe whether it be confined or not to one of its borders, or implicate the whole fore-arm.
9. The direction and amount of any twisting which may be present in the fore-arm.

DISLOCATION OF THE LOWER END OF THE ULNA.—The ulna may be carried either behind or in front of the carpus, by violent motions of pronation or supination.

*Backward* displacement. This is more common than dislocation forwards.

A. **Deformity.**—The transverse diameter of the wrist is diminished, and the antero-posterior, at the inner side of the articular, is augmented. The hand is carried to the inner side. The outline of the articular end of the ulna is discernible on the back of the wrist, and it is somewhat carried across the radius. The finger can trace the unbroken continuation of that articular surface with the shaft of the bone.

B. **Function.**—Supination is impossible. Flexion and extension may to a limited extent be communicated, but they cause much pain.

C. **Length.**—Measured from the inner condyle to the base of the little finger the limb is shortened, yet the ulna (condyle to styloid process) is of normal length.

D. **Axis.**—Hand pronated. Fore-arm, hand, and fingers bent, and the hand inclined to the ulnar side.

E. **Relationship of Processes.**—Styloid process of the ulna no longer in a line with the metacarpal bone of the little finger, and no longer in relationship to the styloid process of the radius.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—The pain, swelling, and discoloration are generally very considerable. The circumference of the wrist is augmented.

DISLOCATION FORWARDS.—Caused by forced supination. The same deformity exists in this dislocation as in the last, only the projection of the ulna is on the front of the wrist, and it lies somewhat across the radius in an oblique direction. The hand is carried outwards, and is supinated. There is a deep depression behind, on the ulnar side of the joint, and this hollow shallows upwards towards the middle of the fore-arm. The styloid process of the ulna has lost its relationship to the carpus and to the styloid process of the radius, and the flat shape of the wrist joint is gone. The function of the articulation is lost, and pronation especially is in abeyance. The swelling is generally very great, and the discoloration marked.

CARPUS ON THE FORE-ARM BONES.—This takes place when the fore-arm, being supported, the hand is violently pressed backwards or forwards. Sometimes it arises from falls on the hand. It is a very rare accident, but may occur either in a forward or a backward direction.

A. **Deformity.**—The antero-posterior diameter of the joint is augmented. There is projection on the front or back of the joint of the smooth, arched, rounded, concave surface of the carpal bones, and on the opposite side the articulating surface and styloid process of the ulna and the radius are found. The flexor tendons in the one case (forwards) are stretched on the projection of the carpus, and the extensor tendons in the other (backwards). The tendons on the side opposite to that on which the carpus is carried are relaxed. The fingers are generally flexed and more rarely extended. The continuity of the fore-arm bones can be traced with the finger, and the deep groove which lies below their extremities is characteristic.

B. **Function.**—Greatly weakened or destroyed.

C. **Length.**—Measuring from the olecranon to the middle finger there is shortening, while from the olecranon to the styloid processes indicates that the length of the fore-arm bones remains intact.

D. **Axis.**—The hand is flexed.

E. **Relationship of Processes.**—The styloid processes of the radius and ulna have lost their relationship to the carpus, and lie in front or behind the carpal projection. They, however, retain their relationship to one another.

In dislocation backwards the styloid process of the radius is in front, and to the inner side of the scaphoid bone, while that of the ulna is projected in front, and to the inner side of the wrist.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—*Pain* and *swelling* considerable, and also *discoloration* usually, as the violence applied is great. The circumference of the part is notably augmented.

All these dislocations of the carpus are easily distinguished from a mere *sprain*, by observing—

(1) The much greater amount of deformity present; and this being due, not to mere swelling of the soft parts, but to displaced bone.

(2) By the shortening of the limb, when measurement is made, from the elbow to the fingers.

(3) By the fixture of the joint, when we examine the part after the patient has been anesthetized.

(4) By the symptoms not appearing in sprain immediately after the accident.

*From Colles' Fracture of the radius* by noticing—

(1) That the deformity is on the anterior and posterior surface across the whole articulation; and not lateral merely, and on the radial side, as in fracture. There is also on the radial border in fracture a peculiar open S-like shape, and when the hand is carried backwards there is the projection on the back of the hand, which are so very characteristic of that injury.

(2) There is no true crepitation (in impacted fracture there is none either) in dislocation.

(3) In dislocation there is the projection of a convex, round, smooth surface on the front or back of the joint, which does not exist in fracture.

(4) Shortening of the limb in dislocation, not of the radius only, as in fracture.

(5) Radius of the normal length in dislocation.

(6) Styloid process of the ulna lower and posterior to that of the radius, and very prominent, in fracture; while it is higher and somewhat anterior to that of the radius, in dislocation.

In *fracture of the radius* at its lower extremity, with displacement forwards of the lower fragment, there are certain features which might lead to confusion between it and dislocation of the carpus forwards; but the deformity is different. In dislocation the posterior tumour is formed by the lower articular ends of the radius and ulna, and its lower border is transverse; while in the fracture referred to, its lower edge is oblique from the ulnar to the radial side upwards, being formed by the ulna and the fractured end of the shaft of the radius. Further, the deformity can be removed with great ease by extension in the case of fracture, and recurs again on the extension being withdrawn, which is not the case in dislocation. Besides this, the irregular fractured end of the shaft can be felt on the back of the fore-arm in the case of fracture, and crepitation is evident when the fragments are by extension and rotation brought into contact.

*From fracture of both ulna and radius low down, and* *separation of the Epiphyses*, the distinction is made by noticing—

(1) That the point of displacement is higher up the fore-arm in these accidents than when dislocation is present, and the projections are more considerable.

(2) That the projections are irregular and rough in fracture, and not of the same character as they are in dislocation.

(3) That the carpus, having portions of the fore-arm bones in connection with it, forms a longer mass than it does in dislocation

(4) The tendons are more stretched in dislocation than they are in fracture.

(5) The radial and ulnar styloid processes remain in connection with the carpus in fracture.

(6) There is shortening of the radius and ulna in fracture.

(7) There is not the same fixture in fracture that there is in dislocation.

(8) Reduction is easy in fracture.

(9) There is marked crepitation in fracture.

OS MAGNUM.—The hand being bent forwards, and the patient falling on it, occasionally forces this bone out of its place. It can be seen and felt as a hard, circumscribed tumour on the back of the hand, in a line with the metacarpal bone of the middle finger. Its projection is somewhat augmented on flexing the hand, and decreased on extending it. It cannot be mistaken for any other affection.

THE PROXIMAL PHALANX OF THE THUMB may be dislocated on the metacarpal bone. This may be complete or incomplete. The signs of the latter accident are much more characteristic than those of the former. It generally takes place backwards, and is caused by falls on the end of the thumb, or forces acting in an opposite direction on the two bones.

The phalanx is forcibly extended, and lies backwards, so as to form an obtuse angle (more rarely a right angle) with the metacarpal bone. Occasionally it lies almost parallel to it.

There is no difficulty from observing the deformity, and examining the articulating surface of the two bones, in recognizing the injury and the relative position of the bones.

FEMUR.—The head of the femur may be displaced from the acetabulum, and lie on any of the surrounding surfaces; but there are three directions in which it is most apt to pass, giving rise to three chief forms of dislocation of the femur.

*The ilio-ischiatic*, in which the head of the bone is carried backwards and upwards, or backwards and downwards; resting on some part of the dorsum of the ilium in the one case, and passing into the great sacro-ischiatic foramen in the other.

*Ischio-pubic*, in which the head of the bone passes downwards and inwards into the thyroid foramen.

*Ilio-pubic*, in which the head of the bone passes upwards and inwards.

A fourth form—that downwards on the ischium—might be added; but being rare, it is better to consider it afterwards.

ILIO-ISCHIATIC. DISLOCATION BACKWARDS AND UPWARDS, OR BACKWARDS AND DOWNWARDS.—This is the most common dislocation of all. It occurs when the thigh is adducted strongly and rotated inwards; or when the limb, being in a position of adduction, receives a diffused blow on its back surface; or the patient falls while carrying a load on his back.

A. **Deformity.**—The hip is deformed, being more than usually prominent. The fold of the hip is higher, and removed further back than usual. The head of the bone, which looks backwards, may be felt on the dorsum of the ilium, and obscurely (in fat subjects not at all) if it be in the foramen. It rotates with the shaft. The trochanter is approximated to the anterior superior spinous process, and is carried backwards. It is at a greater distance from the tuberosity of the ischium than in the normal condition. It lies close to the edge of the acetabulum, and is turned forwards. It is less prominent than usual.

B. **Function.**—There is very little voluntary motion. Adduction and rotation inwards, and flexion, though painful, are possible; while abduction and rotation outwards, and complete extension, are impossible.

C. **Length.**—The thigh is shortened in proportion to the distance which the head of the bone is removed from the acetabulum. The heel is raised, and the ball of the great toe rests on the inner ankle or instep of the sound limb.

D. **Axis.**—(*a*) Long. Thigh lies in a direction from the acetabulum to the sound knee. (*b*) The thigh is flexed on the pelvis, and the leg on the thigh. The knee and foot are rotated inwards; and the knee is carried forwards, and lies in front of the other. Its external condyle looks obliquely forwards.

E. **Relationship of Processes.**—The relationship of the trochanter to the anterior superior spinous process, and to the tuberosity of the ischium, is changed. It lies behind a line passing from the one to the other, when the limb is flexed so as to be at right angles to the pelvis, and slightly adducted, in place of being in a line with these two processes when the thigh is so placed.

F. **Crepitation.**—When observed, is of a coarse rubbing character.

G. **Accessory Signs.**—The pain is not very severe, nor the swelling usually great. The circumference of the upper part of the thigh is increased, and there may be discoloration at the part where the force was applied.

When the head of the bone has passed into the sacro-ischiatic foramen, all the signs noted above will be less marked (for obvious reasons) than when the head of the bone lies on any part of the back of the ilium. There will be less deformity of the hip, less shortening, less inversion and adduction, and less approximation of the trochanter to the anterior superior spinous process. The flexure of the thigh on the pelvis is, however, decided; and when the patient is lying flat on a hard bed it is very evident. If, when the patient is so placed, an attempt be made to straighten the limb, the loins will be arched, and *vice versâ*.

Ilio-ischiatic dislocation can seldom be confounded with fracture of the head of the bone, as the eversion of the limb, in the vast majority of the cases of fracture, will—along with the ease of reduction, the crepitation, and possibly the age of the patient—distinguish them. But in those rarer cases of fracture in which there is rotation of the limb inwards, and especially if the trochanter major is at the same time broken and carried upwards and backwards, so as to resemble the head of the bone in dislocation, the diagnosis is not so easy. The distinction depends on the following points:—

(1) The limb being fixed in dislocation, and its mobility increased in fracture.

(2) The difficulty of reduction in dislocation, its ease in fracture.

(3) The continuance of the reduction when once achieved in dislocation, its almost immediate reproduction in fracture.

(4) The absence of crepitation in dislocation.

(5) Shortening being more decided in dislocation.

(6) Position of the head of the bone, and its rotating with the shaft in dislocation.

(7) Dislocation being usually an accident of middle life, and resulting from great violence, while fracture of the head of the femur is an accident of advanced life, and frequently results from slight violence.

*From fracture of the acetabulum* this dislocation is to be distinguished, as occasionally there is a similar shortening and inversion of the limb in that accident. But such a fracture is a much more serious injury, and is followed by more violent general effects; crepitation is very marked, and the renewed displacement of the bone takes place with great ease.

ISCHIO-PUBIC DISLOCATION (thyroid), *i.e.* displacement downwards and inwards. The head of the bone sometimes lies superficially to, sometimes below, the obturator muscle. It is produced when the limb is violently abducted and rotated inwards, as in falls (especially if there be a burden on the patient's back), when the limbs are separated.

Falls backwards under a horse have also been seen to cause it.

**A. Deformity.**—The hip is flattened and sunk. The fold of the hip is lower than natural. The head of the bone is felt rotating with the shaft below the groin, at the upper and inner aspect of the thigh, in thin persons. The prominence of the trochanter is gone, and it may be even replaced by a hollow. The trochanter is inclined backwards, and is removed further than usual from the anterior superior spinous process of the ilium. Sometimes the head of the bone lies very low down ("perineal" luxation of Malgaigne), and can be felt in the perineum.

The trunk is somewhat inclined towards the injured side, and is bent forwards on the thigh. The psoas and iliacus are tense.

B. **Function.**—Voluntary movements are very limited. The limb cannot be adducted, extended, or rotated inwards; but abduction and flexion are communicable to some extent, though causing much pain.

C. **Length.**—The limb is lengthened to a degree proportioned to the downward displacement of the head of the bone.

D. **Axis.**—(*a*) Long. The limb lies away from the centre line of the body, being drawn from its fellow, so that the axis is downwards and outwards and a little forwards from the groin. The limb is somewhat advanced also. (*b*) It is rotated slightly outwards, so that the toes point somewhat outwards as well as forwards (frequently straight forwards, more rarely inwards). The thigh is flexed slightly on the pelvis, and the leg on the thigh; the knee is advanced. When lying in bed the heel reposes on the inner side of the instep of the sound limb, and the foot lies outwards on the bed. In walking, the patient carries the foot in the arc of a circle in advancing.

E. **Relationship of Processes.**—The trochanter has lost its normal relationship to the anterior superior spinous process, being removed from it, and lying lower and more internal than usual.

G. **Accessory Signs.**—The pain is great usually, and the circumference of the upper part of the thigh (after the immediate effects of the injury have passed off) is less than normal, from the stretched state of the muscles.

The lengthening of the limb, its fixture, the position of the knee and foot, and that of the trochanter and head of the bone, will render this accident easily distinguishable from any fracture of the head of the femur.

ILIO-PUBIC. DISPLACEMENT UPWARDS AND INWARDS ("pubic").—The head of the bone lies usually to the outside of the femoral vessels under the psoas and iliacus, which are raised by it. It is caused by violence applied to the back of the thigh during abduction, or from the body being thrown backwards while the limb is fixed.

A. **Deformity.**—The hip is flattened. The fold of the hip is higher than usual. The head of the bone can be clearly felt (rotating with the shaft) high in the groin. The trochanter is carried forwards and inwards, being nearly in a vertical line with the anterior superior spinous process. It has lost its prominence. The body is bent forwards, and the psoas and iliacus are tense.

B. **Function.**—Voluntary movements are almost impossible. Adduction and rotation inwards cannot be performed; but abduction and rotation outwards are communicable.

C. **Length.**—There is shortening of the thigh as a *rule;* sometimes there is little change; rarely there is lengthening.

D. **Axis.**—(*a*) Long. The axis is downwards and outwards from the groin. (*b*) Rotation outwards, so that the knee and foot are turned out. The thigh and knee are extended usually, and occasionally they are slightly bent, and the limb is carried away from the centre line, but less so than in the ischio-pubic variety.

E. **Relationship of Processes.**—The trochanter is nearer the middle line than normal.

The pain in the groin is great from the pressure on the anterior crural nerve, and the circumference of the upper part of the thigh is diminished.

When, in fracture of the neck of the femur, the limb is rotated outwards (as is usual), the distinction between it and ilio-pubic dislocation is made by observing—

(1) The absence of the projection of the trochanter, and its displacement towards the middle line.

(2) The head of the bone lying above the groin.
(3) There being no crepitation.
(4) The difficulty of reduction.
(5) The fixture of the limb.

Of the rarer positions assumed by the head of the bone in dislocation of the femur, that downwards ("ischiatic" of Malgaigne, "sub-cotyloid" of others) is one of the best marked.

The thigh is flexed; the hip is prominent; the limb is adducted and rotated inwards; the head of the bone is found low down and behind. The trochanter projects backwards, and is turned forwards, and removed somewhat away from the anterior superior spinous process of the ilium. The limb is shortened when flexed, lengthened when extended. The circumference of the thigh is increased.

The head of the bone may lie on the spine of the ischium, or between the tuberosity and the spine, or behind the tuberosity, or in the notch below the acetabulum. It may be placed on the ascending ramus of the ischium, and between it and the anterior inferior spinous process, or between this process and the anterior superior.

In diagnosing the three chief forms of dislocation of the femur from one another—(*a*) Ilio-ischiatic, (*b*) Ischio-pubic, (*c*) Illo-pubic—it will be observed that as regards the

A. **Deformity.**—In (*a*) the *hip* is prominent and raised.

In (*b*) the hip is flattened and sunk.

In (*c*) the hip is flattened.

In (*a*) *fold* of hip higher and further back than normal.

In (*b*) fold lower than normal.

In (*c*) fold higher, but not further back, than normal.

In (*a*) *the head of the bone* felt above or behind the acetabulum.

In (*b*) the head of the bone below the groin.

In (*c*) the head of the bone in the upper part of the groin.

In (*a*) trunk little affected.

In (*b*) bent forwards, psoas and iliacus tense.

In (*c*) Do. do.

B. **Function.**—In (*a*) adduction and rotation inwards easy, abduction and rotation outwards impossible.

In (*b*) abduction and flexion easy, adduction, extension, and rotation inwards impossible.

In (*c*) abduction and rotation outwards easy, adduction and rotation inwards impossible.

C. **Length.**—In (*a*) shortened.

In (*b*) lengthened

In (*c*) shortened, but not to so great an extent as in (*a*).

D. **Axis.**

1. Long axis.

In (*a*) downwards and inwards to the sound knee.

In (*b*) downwards and outwards, away from the other limb.

In (*c*) downwards and slightly outwards, but not so far removed from the middle line as (*b*).

2. In (*a*) rotation inwards. Great toe on the instep or base of great toe of the sound foot. Adduction.

In (*b*) rotation outwards. Toes point forwards and slightly outwards. Abduction.

In (*c*) rotation outwards of the foot more marked than in (*b*). Abduction.

In (*a*) slight flexion of the leg on the thigh.

In (*b*) Do. do. do.

In (*c*) extension of the leg on the thigh.

E. **Relationship of Processes.**

In (*a*) trochanter approximated to the anterior superior spinous process, and carried somewhat backwards. It looks forwards, and is less prominent than normal.

In (*b*) trochanter inclined backwards, is further removed (lower and more internal) than normal from the anterior superior spinous process, and it is less prominent.

In (*c*) trochanter carried forwards and inwards towards the middle line. It is less prominent.

**Mere** contusion of the joint, from falls on the trochanter, has been mistaken for dislocation of the femur, in consequence of the apparent shortening of the limb which attends that accident. Great pain also, and ecchymosis, and loss of function, are present, but the distinction is made by observing—

(1) That the shortening is only apparent, and is due to the involuntary inclination of the patient towards the affected side, in order to relax the muscles, and so relieve pain. If the pelvis is placed perfectly straight, and the limbs parallel, no shortening will be found. If there is dislocation, on the other hand, the change in the length of the limb will be demonstrable.

(2) If the patient is put under chloroform the movements of the joint will be found free when it is merely a contusion.

(3) The trochanter will occupy its normal position in mere contusion, and the head of the bone will not be found on any part of the surrounding surfaces.

(4) If there be still a doubt, it will be found, that while rest causes the symptoms in contusion to disappear in a few days, it will have no effect on a dislocation.

PATELLA.—May be complete or incomplete. May take place outwards (which is most common), inwards, or vertically; one of its lateral edges being anterior and the other posterior. This accident is most apt to take place after the sudden disappearance of dropsical effusion from the articulation of the knee.

*Complete dislocation outwards.*—This is more common than dislocation inwards, because the inner condyle is not so prominent as the outer, and the inner side of the patella being thicker than the outer, renders it more liable to external violence. Dislocation of the patella is most apt to occur when the knee is semiflexed, and receives a concentrated blow on the inner edge, or from a sudden muscular contraction, as when a person is tripped by his toe catching. It is most apt to take place in persons who have relaxed joints, and whose knees are "in" or "out," by which the great extensor tendon acts on the patella at a disadvantage.

A. **Deformity.**—In complete dislocation outwards there is a hollow in front, in which the outline of the articulating surfaces may be discovered. This hollow takes the place of the rounded form of the patella. The breadth of the articulation is considerably increased. The inner condyle projects, and its outline can be traced. The patella can be felt lying in a slightly oblique direction on the external surface of the joint, where its outline can be defined, and it can be moved in its new position. Its external surface is turned outwards, its under surface being against the external condyle, and its anterior face is turned forwards, where it is felt sharp beneath the integuments on the external edge of the outer condyle. The vastus internus is tense and prominent on the inner side, and the portion of the rectus tendon above the patella is directed obliquely outwards and downwards, and that below the patella has the opposite direction, being oblique from above, downwards, and inwards.

B. **Function.**—The limb is fixed, and very slight movement can be communicated to it; and such as can be produced gives rise to great pain.

C. **Length.**—Unchanged.

D. **Axis.**—The axis of the patella no longer corresponds to that of the femur, but it is turned so as to lie obliquely from below, upwards and backwards. The limb is usually flexed, though occasionally it is straight.

E. **Relationship of Processes.**—Patella no longer retains its relationship to the condyles of the femur and tibia.

The pain and swelling are often very considerable.

When the dislocation is incomplete all the above-noted signs are much less evident. The patella can be felt, and seen lying on the external condyle, its outer sharp border raised and projecting outwards and forwards, and the anterior surface inclined inwards towards the inter-condyloid notch, into which the inner edge is depressed. The inner side of the joint is sunk, and the inner condyle of the femur is there apparent. The patellar ligament forms a ridge running obliquely from above and without, downwards and inwards. Voluntary motion is impossible, and passive motion gives great pain. The leg is extended and fixed on the thigh.

*Dislocation inwards* is very rare indeed. When present its characters are similar, "mutatis mutandis," to those above described.

*Vertical displacement* occurs when one of the edges of the patella is turned forwards, and the other lies between the condyles of the femur. It is just the incomplete form of lateral dislocation, in which the turning of the patella on its long axis is carried to such a degree as to make the bone stand on one edge. It is caused by violent muscular contraction, accompanied possibly by a twist when the limb is semiflexed. There is a sharp projection of the patella in front, and a hollow on either side of it. We can pinch it between the fingers. The condyles of the tibia and femur are in their normal position. The limb is extended, and flexion is impossible. As the external surface may look either outwards or inwards, according to the way the bone is twisted, there are two forms of dislocation, which have been designated "the internal" and the "external vertical" dislocation, according to which edge of the bone projects in front; and we recognize the position in which the bone lies, by observing how the rectus tendon above and below the patella is placed, and also by noticing that the external border of the bone is thinner and sharper than the internal.

TIBIA.—Dislocation of this bone may occur either backwards or forwards, or laterally or by rotation. The leg being fixed, the thigh (and trunk) are pressed forcibly forwards or backwards, or to the side; or the thigh being fixed, the leg is forcibly carried in some of these directions; or violence is applied to the lower end of the femur, or upper end of the tibia, in certain positions of the limb; or a violent twist of the leg is sustained; and thus these dislocations are produced.

*Backwards. Complete dislocation.*

A. **Deformity.**—It is very great, and the antero-posterior diameter of the limb at the joint is greatly increased. In front, the condyles of the femur project, with a hollow below them on either side of the patella, and its ligament will occupy the middle of the space, masking the intercondyloid groove. The anterior surface of the patella slopes backwards and downwards, so as to be almost horizontal. The condyles of the tibia project into the popliteal space, where they may compress the vessels and nerves very injuriously. Immediately above them there is a deep depression across the limb.

B. **Function.**—(*a*) Voluntary motion destroyed; (*b*) passive motion very limited, and causes much pain. The leg is easier carried forwards than backwards.

C. **Length.**—Limb shortened. This is especially seen when it is looked at from the front. The femur and tibia individually are of normal length.

D. **Axis.**—The leg is out of axis with the femur, being carried behind it, and it is also somewhat rotated on its own axis.

E. **Relationship of Processes.**—The normal relationship between the condyles of the femur and tibia, and between them and the patella, is lost.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—Pain is very great. Numbness and coldness, and œdema, frequently result from the pressure on the popliteal vessels. There is often discoloration in the popliteal space, and the circumference of the joint is augmented.

In the incomplete form of the above dislocation there is an unnatural projection of the condyles of the femur and tibia; the length of the limb is unaltered, though when looked at from the front it appears shortened, in consequence of the deformity which exists; the limb is generally in a state of extension, more rarely flexed; the axis of the leg is changed, and the patella lies lower than usual, its anterior surface being inclined downwards and forwards. The circumference of the articulation is increased, and there is much pain.

*Dislocation forwards. Complete.*

A. **Deformity.**—There is projection of the condyles of the tibia in front, and those of the femur behind. The outline of the articulating surfaces is apparent to the touch, in consequence of the thinness of the overlying parts. A deep hollow exists above the tibia and below the end of the femur, the latter being somewhat masked by the rectus tendon. The patella lies nearly horizontally on the articulating surface of the tibia, its anterior surface looking upwards and forwards. The patellar ligament is tense. The tubercle of the tibia is prominent.

B. **Function.**—(*a*) Voluntary motion in abeyance; (*b*) passive motion, though painful, yet possible, and sometimes tolerably free in an antero-posterior direction, if the swelling is not great. The foot can be carried backwards easier than forwards.

C. **Length.**—Shortened. Looked at from the front the leg appears unchanged in length, but when viewed from behind it is evidently shortened. The thigh, on the contrary, appears shortened in front, and of normal length from behind.

D. **Axis.**—(*a*) Tibia not in the axis of the femur, but anterior to it; (*b*) slight rotation. Limb in an extended or slightly flexed position.

E. **Relationship of Processes.**—The condyles of the femur and tibia, and the patella, have lost their normal relationship to one another.

F. **Crepitation.**—Absent.

G. **Accessory Signs.**—Pain very great, and frequently numbness, coldness, and much swelling, from pressure on the vessels. The circumference of the knee is increased.

In the incomplete form of the displacement, (1) the shortening of the limb is absent; (2) the projection of the condyles is not so marked, and they are on a level; (3) the patella does not lie so horizontally, and its ligament is relaxed; (4) the long axis of the leg does not so much differ from that of the thigh; (5) the antero-posterior diameter of the joint is not so changed; and (6) the pain and interference with the circulation are not so marked.

*Lateral Dislocation.*—Always incomplete. Projection to either side of the condyles of the femur and tibia—the outline of each being evident. There is a hollow below and above these projections, *i.e.* when the tibia is displaced inwards, there will be a triangular depression looking inwards and upwards above its condyle; while externally, below the condyle of the femur, there will be a similar hollow turned in the opposite direction, that is, outwards and downwards. The lateral diameter of the joint will be much augmented, and the patella with its ligament will be drawn laterally, so as to slope obliquely towards the position of the tibia.

The limb is sometimes extended and so fixed; but usually it is slightly flexed and rotated on its long axis. There is no shortening. The axis of the tibia is to the side of the femur, and voluntary and passive motion are both very much restricted.

*Displacement of the Tibia by rotation* is a very rare accident, and may implicate the whole articulating surface of the bone, so that both condyles lose their relationship to the articulating surfaces of the femur; or one remaining (though rotated) in connection with the corresponding condyle of the femur, the other (generally the inner) is thrown off. This accident may arise from sudden and violent twists of the leg, in which it and the foot are carried outwards or inwards; or it may arise from twists of the body when the leg is fixed. The projection of one condyle of the tibia, and one of the femur, in front or behind; the patella carried to the side; the unchanged length of the limb; the eversion or inversion of the foot; the limb being semi-flexed, and the antero-posterior diameter of the one side of the articulation being augmented; the head of the fibula being carried forwards or backwards—will mark this accident.

THE FOOT ON THE LEG, *i.e.* displacement of the astragalus (it retaining its normal connection with the other bones of the tarsus) from the leg bones.

This dislocation is rare without fracture of the bones of the leg; but it may occur either in a backward, forward, or lateral (this never without fracture) direction; also upwards, between the tibia and fibula; and lastly, by rotation or twisting.

(1) *Forward*, and (2) *backward* dislocation—the latter being the more common of the two. The signs of these dislocations are similar, only reversed. The accident is caused by violent flexion (forwards) or extension (backwards) of the foot on the

leg; or falls, in which the astragalus is thrust behind or before the bones of the leg.

(1) The foot lengthened, and the projection of the heel is gone.

(2) Foot shortened, and projection of the heel increased.

(1) Articulating surface of astragalus felt in front of the leg bones.

(2) Articulating surface of the astragalus felt behind the leg bones.

(1) Tendo Achillis relaxed and very concave, being in contact with the posterior surface of the tibia.

(2) Tendo Achillis tense and prominent.

(1) Malleoli carried backwards towards the heel, and downwards towards the sole.

(2) Malleoli carried forwards towards the toes, and downwards towards the sole.

The malleoli are generally fractured, especially the external one, and then crepitation will be observed, and a hollow will be found where the breach of continuity exists.

(1) Toes drawn up, and the heel thrust down.

(2) Toes drawn downwards, and the heel raised.

The position of the displaced bones can be best made out by raising the toes and depressing the heel in the dislocation forwards, and reversing the manœuvre in the dislocation backwards.

*Lateral dislocation*, always combined with fracture of the tibia or fibula. It is produced by falls on the side of the foot, or falls in which the foot is carried forcibly outwards or inwards.

(1) Outward, and (2) Inward displacement of the astragalus on the leg bones.

(1) Foot lies on its outer side.

(2) Foot lies on its inner side.

(1) Sole turned inwards.

(2) Sole turned outwards.

(1) Articulating surface of the astragalus felt on the inner side below the malleolus.

(2) Articulating surface of the astragalus felt on the outer side below the malleolus.

(1) The external malleolus projects.
(2) The inner malleolus projects.
(1) The internal malleolus obscurely felt.
(2) The external malleolus obscurely felt.

There will be crepitation accompanying fracture of the malleoli, and a hollow at the place of disruption of the bone. The pain is very severe. Voluntary movement is absent, but passive motion remains.

*Displacement upwards.*—Here the fibula at least is fractured. In some very rare cases no fracture has been found; but the bones of the leg separated and the astragalus forced up between them. The bone retains (or nearly so) its normal position; but the leg is shortened, and the circumference and breadth of the limb above the ankle are greatly augmented. The malleoli are separated, and the space between them is much increased. If the malleolus is unbroken, it is carried downwards towards the sole, and the movements of the foot are nearly annulled. The swelling and pain are great, and crepitation will be produced if there is fracture accompanying the displacement.

*Displacement by rotation.* — Here the foot is forcibly abducted, the heel is drawn inwards, almost under the internal malleolus, the joint is fixed, and pain and swelling are great. There is usually fracture of some of the bones.

*Dislocation of the astragalus from all its connections.*—This arises from violent pressure of the leg bones downwards and to one side, acting obliquely on the astragalus, especially if accompanied by a violent wrench or twist when the foot was extended. It is frequently by direct violence that this accident is produced, and a wound may expose the bone. The bone may be displaced forwards (most commonly) or backwards, and may incline to the outside or inside of the tarsus.

There is a hard tumour, the outline of which is distinct to the hand, formed by the bone in front or behind the articulation of the ankle. The malleoli are pressed downwards towards the sole of the foot, and the leg is shortened. The joint is fixed, all movement being destroyed. The pain, discoloration, and swelling are great. The foot is twisted on itself and remains in forced extension or flexion.

In a rare form of this dislocation the astragalus is entirely turned on itself, so that the under surface looks upwards.

CALCANEUM AND SCAPHOID.—Dislocation of these bones, carrying the rest of the foot (all but the astragalus) with them, occasionally occurs. This may take place (but rarely) in a backward or lateral direction.

*Backwards.*—The leg bones and the astragalus are carried forwards towards the toes, thus shortening the dorsal surface of the foot, while the heel is projected backwards and lengthened. The malleoli remain about their usual height from the sole, and the tendo Achillis is tense. The foot is extended and fixed, and the pain and swelling are usually great.

In *lateral displacement* (outwards most common), the appearance of the foot is very much that which it presents in talipes, as the foot is contracted on itself, and one of its borders is shortened and concave, and the other the reverse. One edge rests on the ground (the inner in dislocation outwards, and the outer in dislocation inwards), and the other edge is elevated. The astragalus may be felt on the side to which it has been carried. The foot is forcibly abducted, and the toes carried outwards, and the heel inwards, in dislocation outwards; while in dislocation inwards the foot is adducted, and the toes carried inwards and the heel outwards. The arch of the foot is lost. One malleolus is prominent, and there is a void below it. The other malleolus is masked by the body of the calcaneum lying below it. Voluntary motion is lost; but passive flexion and extension are retained, though abduction and adduction are impossible.

Dislocation of the calcaneum may be distinguished from dislocation of the astragalus by observing—

1. That the motion of flexion and extension remains.
2. By feeling the displaced surfaces of the bones.

The *metatarsal* bones are sometimes by direct violence dislocated upwards on the tarsus, when a prominent ridge and hollow will appear, both on the dorsal and plantar surface of the foot. The foot will be shortened, the concavity of the sole becoming convex, and the foot being no longer capable of use.

**DYSPHAGIA.**—Difficult deglutition. This condition may depend on a great variety of causes, some of which it is difficult at times to recognize. These causes are either from A. Functional, or B. Organic Derangement.

A. **Functional.**—(*a*) A purely nervous affection. It occurs in persons of a weakly, nervous, or hysterical temperament; when it will be accompanied by the well-known signs of such a disposition. In many cases it appears in connection with spinal irritation or derangement of the uterine functions. In such cases the dysphagia comes on in paroxysms suddenly and capriciously, and disappears as rapidly, frequently without evident cause. Its attacks are sometimes intermittent. There is no constitutional disturbance. The patient is in some instances anæmic, at other times bears the impress of comparative health. Its attacks may be of short duration, or may last for weeks, and it is curable by those remedies which are found useful in hysterical diseases generally.

Further, the passage of a probang shows that the gullet is free from obstruction, and deglutition is occasionally unimpeded if the patient's attention is distracted from the act.

(*b*) Interference with the innervation of the gullet from pressure or disease in the brain, or upper part of the spinal cord, or from derangement of the whole nervous system. In apoplexy, congestion, tumours, &c., this is occasionally seen. So, too, in epilepsy, mania, low fevers, hydrophobia, tetanus, asthma, the gullet is less or more paralyzed, or spasmodically closed. The paralysis may be confined to the pharynx and œsophagus, or it may be part of a general paralysis, in which case there will be sufficient evidence from other sources to indicate the cause of the dysphagia. In such cases, too, it will be found that fluids are more difficult to swallow than solids, and the use of the probang will disprove the existence of any actual contraction of the canal.

B. **Organic Obstructions.**—(1) *Within the canal.*

(*a*) Malformations of the mouth, tongue, palate, or throat. These are easily recognized.

(*b*) Inflammation or other affection (ulceration, the formation of false membranes, &c.), wounds or other injury, swelling of the mouth, palate, tonsils, pharynx, epiglottis, &c., œsophagus, or cardiac orifice of the stomach. These are discoverable by sight, touch, or instrumental examination.

(*c*) Constriction of the gullet (*see* ŒSOPHAGUS). In these cases the malady is slowly and almost imperceptibly established. The first symptom the patient observes, is when he finds difficulty in swallowing a solid morsel. Emaciation after a time appears, though frequently the appetite remains good. The difficulty of swallowing never disappears, although at times it is worse than others. By the probang we find the contraction.

(*d*) Tumours or growths within the passage. Polypi of the pharynx, or posterior nares, hanging down into the pharynx; cancerous or other growths of the same part, or of the œsophagus, &c. We may discover these growths by inspection, or by examination with the finger or probang, or it may be by the œsophagoscope; and if the disease be cancerous there will be other unmistakable evidence (dwelt on elsewhere) of its character.

(*e*) Foreign bodies impacted in the pharynx or œsophagus. Foreign bodies that are sharp and irritating are especially liable to produce dysphagia. These are recognized by the history of the case, and by digital or instrumental examination. (*See* ŒSOPHAGUS.)

(*f*) Dilatation, general or partial, of the œsophagus; the existence of a sac or diverticulum on the passage. (*See* ŒSOPHAGUS.)

(2) *External to the canal.*

(*a*) Inflammation, swelling, or ulceration of the epiglottis or larynx, in which case we will have laryngeal symptoms preceding or accompanying the dysphagia. These symptoms will be (probably) dyspnœa, altered voice, spasmodic or croupy cough, and the dysphagia will be spasmodic, and by the finger and laryngoscope the morbid condition will be discoverable.

(*b*) The pressure on the canal, or on the pneumo-gastric, of growths in the posterior mediastinum or the neck. Glandular (cervical, thyroid, thymous, or bronchial), cancerous, scrofulous, or other tumours. Disease or growths (exostosis, cancer, fibrous tumours, &c.) of the spinal column, abscess, aneurism of the carotid, subclavian, innominate, or aorta. Dropsy of the pericardium, and even a greatly enlarged liver; and lastly, dislocation backwards of the sternal end of the clavicle.

Many of these causes of dysphagia are visible, especially as the patient is usually emaciated from the want of proper nourishment; others are to be discovered by a careful attention to their proper signs, by palpation, percussion, and auscultation, and by observing the accompanying symptoms. Thus, in aneurism we will have, besides what information percussion, auscultation, and digital examination may give, probably dyspnœa, pain fixed in some part, or passing up the side of the head and down the arm; also, in some cases, a varicose state of the veins of the chest, œdema of the hand and arm, and a want of correspondence between the pulse of either arm.

**DYSPNŒA.**—Difficult breathing. A symptom of many different affections. In itself it merely shows "that the healthy and natural relation between the quantity of air in the lungs is disturbed;" but, in order to rectify what is wrong in this relationship, it is requisite to determine its cause, and that must be done by having recourse to many means of investigation, of which auscultation, percussion, and the examination of the pulse are the most important.

To recognize dyspnœa is sufficiently easy. No description of it is required. When extreme it gives rise to the most terrible suffering, and causes symptoms which are very distinctive. The elevated shoulders, arched back, discoloured anxious face, clammy sweat, the larynx moving up and down rapidly or laboriously, the short interrupted speech, all produce a picture which cannot be misunderstood. Dyspnœa may occur in paroxysms, and it is usually aggravated by exertion or certain postures. The various sources from which it may arise may be thus classed.

(1) An obstacle to the entrance or exit of the air. Enlargement of the tongue, tonsils, or uvula; closure from any cause

of the nostrils; inflammation of, or effusion into, the pharynx, glottis, larynx, trachea, or bronchial tubes. Foreign bodies in the pharynx, œsophagus, larynx, or trachea, or ulceration in these parts. Pressure from without on the air-passages, as in enlargement of the cervical or bronchial glands, or of the thyroid from hypertrophy, cancer, tubercle, &c.

(2) Affections of the substance or covering of the lung, as in phthisis, pneumonia, pleurisy, congestion, wounds of the lung, emphysema, &c.

(3) Affections of the heart or great vessels, as carditis, pericarditis, aneurism of the aorta or great vessels at the root of the neck (which may act by direct pressure on the air-passages or lungs, or by compressing the vagus or the recurrent nerves), pressure on the pulmonary veins, &c. In the last case there will be pulmonary congestion and lividity of the surface.

(4) Conditions of the air respired, as when it is deficient in oxygen, or contains deleterious constituents.

(5) Conditions of the blood circulating in the lungs, as in morbus cœruleus, chlorosis, anæmia, Addison's disease, pyæmia, &c.

(6) Interference with the innervation of the respiratory apparatus, or weakened conditions of the nervous system generally. Affections of the brain or upper part of the spinal cord; effusion at the roots of the eighth pair of nerves; pressure on the recurrent nerve; and affections producing great exhaustion, such as low fevers. It is also seen in tetanus, hydrophobia, hysteria, asthma, &c.

(7) Affections of the parietes and muscles of the chest and abdomen; spasm or pain, or paralysis of the thoracic or abdominal muscles, or the diaphragm; wounds or contusions, or inflammation of the parietes; ossification of the cartilages of the ribs, or fracture of the ribs or sternum; distortions of the spine or chest.

(8) Effusions of blood, pus, serum, air, &c., into the pleural cavity, by which the lung is compressed.

(9) Pressure exercised on the lungs from the effusions of fluid or air into the abdomen, or by tumours, pregnancy, or enlarged viscera in that cavity.

From all this it appears that in order to recognize the cause of dyspnœa in any given case, a careful and prolonged examination may be necessary. In those instances in which there is direct pressure acting on the windpipe, the difficulty of breathing will be accompanied by certain sounds, such as wheezing, whistling, crowing, hissing, &c., and this chiefly during inspiration; though it may be during expiration, or both. There will also usually be cough and expectoration. The peculiar whistling respiration observed in those cases is looked on by some as being pathognomonic of pressure on the air-passages, and as being quite easily distinguished from other abnormal breath sounds. By closing the nares all similar sounds arising from the nose are arrested; and the voice remaining intact, shows they are not laryngeal. They are also said to be always drier, and not of the bubbling character of tracheal sounds. Being chiefly inspiratory, sharp, and dry, and heard best in the middle line, they are further distinguished from pulmonary sounds, which are expiratory and more prolonged, and heard loudest over the lungs themselves. If a portion of the lung is shut off by the bronchial tube leading to it being closed, then by auscultation and percussion that can be determined. The voice is changed when the larynx or its nerves are affected; and it becomes weakened, or hoarse, or squeaky, and a loud croupy cough also commonly coexists. In that case, also, the symptoms occur in paroxysms.

If the dyspnœa depends on an intra-thoracic tumour, change of posture, by influencing the amount of pressure, will probably produce an evident effect on the dyspnœa, and the state of the pulse in either wrist, together with auscultation and percussion, will discover the malady.

The respiration is sighing in pulmonary and cardiac congestion, in nervous exhaustion, hysteria, &c. If the lungs are affected so as to cause dyspnœa, a full deep inspiration cannot be made, as it can when the symptoms are due to cerebral congestion. In advanced cardiac and pulmonary disease, the respiration is gasping as well as difficult, as it is also in asthma; and this last complaint confines its attacks chiefly to the night, occurs in paroxysms, with intervals of cessation, and is affected by atmospheric variations.

**DURA MATER,** Fungus of the. Cancer.—This disease does not always originate from the dura mater, but may begin in the diploë, or in the pia mater, and may be connected with the outer or inner surface of the dura mater.

While this malady may occur at any part of the skull, it is in the parietal region that it is most common, and it is extremely rarely met with at the base. It may vary greatly in size. It is usually single, and in the progress of time comes to perforate the bone, and show itself externally. It may be slow in growth, and in some rare cases may even remain stationary for years; but usually it tends to increase steadily and rapidly.

(1) When entirely within the skull, it may occasion no signs at all by which it can be recognized. Generally, however, there is a fixed pain at the spot, and obscure cerebral symptoms, vomiting, somnolence, giddiness, double vision, blindness (pupils dilated and probably fixed), or deafness, epileptic fits, hemiplegia, &c.

(2) When the bone is being absorbed, it will be found so thinned over the growth as frequently to crackle like parchment.

(3) After perforating the bone, we have a round, bossy, smooth, elastic, pulsating tumour, which is increased on forced expiration, and often exhibits a slight movement in ordinary respiration. Occasionally the vessels of the scalp around the tumour pulsate, as well as the growth itself. This tumour is compressible, so that it can be partially or wholly reduced; and when this is accomplished, signs of compression of the brain follow, which disappear so soon as the pressure is removed. There is little if any lateral movement in the growth. The irregular aperture in the bone through which it protruded, is perceptible after the reduction of the tumour. The growth is generally painless; but when it is accompanied by uneasiness, this is relieved by the application of pressure. If any special nerve is implicated, special symptoms referable to that nerve will result. When ulceration takes place, then the character of the growth will be so evident, that no error on that head can be made. The differential diagnosis of this disease is referred to in the succeeding article.

**ENCEPHALOCELE** is a congenital protrusion of the brain through the skull. The most common position for it to appear in, is the occiput; but it may show itself through any of the sutures or fontanelles when the ossification is deficient. Occasionally it is met with at the angle of the eye; sometimes it projects into the nose and into the pharynx. Usually it is single; but it may be multiple, as in a preparation in the writer's possession. Encephalocele is very commonly associated with other congenital affections, as harelip, spina bifida, hydrocephalus, &c. The tumour may vary in size from a pea to that of the head proper. The membranes of the brain may be its only coverings, or it may retain the integuments of the skull as well, and these remain unchanged in colour, and also generally in thickness, unless they have been subjected to great distension. Sometimes in the fore part of the head the growth is of a violet hue, like an erectile tumour.

Encephalocele appears as a round or elongated tumour, frequently constricted at its base, where it passes through the bone. It is smooth, elastic, non-transparent, and circumscribed. It is immovable laterally, but may be diminished or caused wholly to recede within the skull by steady pressure. These tumours cause little or no pain, and seldom produce any disturbance of the intelligence. There is a double movement in the growth itself—one synchronous with the pulse, and the other coinciding with expiration. During forced expiration or violent efforts of any kind, such as crying, coughing, &c., the tumour is raised, augmented in volume, and slightly reddened.

When the tumour is reduced, symptoms of cerebral compression become manifest; somnolence, hemiplegia, fainting, or insensibility, squinting, &c. The smooth circle of bone through which the protrusion has taken place, may be felt when the tumour is reduced; and so soon as the pressure is removed, the tumour reappears, and the symptoms of compression pass off.

Encephalocele is sometimes combined with hydrocephalus, and then the tumour may be transparent; and those signs above noted which are dependent on immediate contact with the encephalocele (pulsation, increase on expiration, reducibility, &c.) may be obscured or wholly masked.

It were well here to record the diagnosis of the various cranial tumours, including encephalocele. These tumours are as follows:—

A. **Extra-cranial.**—(1) Exostosis; (2) wens; (3) bloody tumours following blows; (4) cephalæmatoma; (5) erectile or other vascular tumours; (6) abscess; (7) tumours formed over diseased bone (caries or necrosis).

These are all external to the bones of the skull. They have no connection with the brain, consequently there is no perforation of the bone, and they exhibit none of those symptoms noted below, which appear in tumours coming from within the cavity. These tumours are thus distinguished among themselves.

(1) *Exostosis.*—Extreme hardness; slow growth; immovability, and being generally circumscribed and prominent. They are usually multiple.

(2) *Wens.*—Movable; indolent; slow growth; no change in the skin; soft and pulpy to the touch; no pulsation; frequently a small black speck of the duct is seen on their surface.

(3) *Bloody tumours.*—They follow blows; are immovable, hard at their circumference, and fluctuant at their centre, a feature also belonging to (4). When by pressure made with the finger the surface of the bone is reached, it is found to be at its usual level.

(4) *Cephalæmatoma* may present the same characters as the last (sub-pericranial form); but they occur only in the infant after birth. They are confined to particular bones; do not pass the sutures, and pressure on them causes no cerebral disturbance. These tumours in very rare cases pulsate. Generally they are large, and distinctly fluctuant (sub-aponeurotic form).

(5) *Erectile or other vascular tumours.*—These are movable; soft and doughy to the touch; the colour of the skin is sometimes violet, sometimes unchanged; and they pulsate. The bone, however, below is entire, and they are diminished in size by pressure. Pressure on the common carotid arrests the pulsation. There is no movement with the expiration.

(6) *Abscess.*—This is preceded by signs of inflammation, and the swelling passes from a hard to a soft state, becoming ultimately fluctuant.

(7) *Tumours over carious or necrosed bone.*—These are flat, immovable, doughy, and ill circumscribed, with a history of syphilis or injury to the part.

B. **Intra-cranial**, coming from within the skull; perforating the bone, and presenting itself as a tumour on the external surface. These tumours are, (1) encephalocele; (2) fungus of dura mater; (3) hernia cerebri; (4) dropsy of the brain. It may be added that hydatid cysts, and hypertrophied Pacchionian bodies have been known to perforate the inner table of the skull by their pressure.

There are certain symptoms which are common to all of these tumours, and which symptoms depend on their intra-cranial origin. These symptoms are—

(*a*) Pulsation synchronous with the pulse.

(*b*) Slight movement with the expiration, and enlargement on forced expiration, as in crying, coughing, &c.

(*c*) Reducible on pressure more or less completely within the skull.

(*d*) When reduction is effected, indications of compression of the brain arise, stupidity or insensibility, hemiplegia, squinting, &c.

(*e*) Reappearance of the tumour when the pressure is removed.

(*f*) The aperture in the bone is found when the tumour is reduced.

These characters all distinguish intra- from extra-cranial tumours. It is proper, however, to remark, that in exceptional cases, when the aperture in the skull is very small, there may be no pulsation; the tumour may not yet be reducible; the aperture may not be discoverable; and pressure may produce no disturbance of the brain. Such a condition however is rare and exceptional. The different intra-cranial tumours above mentioned may be thus distinguished from one another.

(1) *Encephalocele.*—It is congenital; it occurs generally at the occiput, or at a suture, or at one of the fontanelles. It is

painless, has commonly a constricted base (pedicle), and does not tend to increase. If it does enlarge, it does so slowly. It is not transparent as a rule.

(2) *Fungus of the dura mater* occurs in adults, and most frequently in the parietal region. It is not transparent, is generally preceded by signs of cerebral disturbance or fixed pain before it appears externally (not invariably, however), and by parchment-like crackling of the bone when it has nearly perforated it. Pressure gives rise to marked cerebral disturbance. The opening in the bone is irregular; and though most frequently met with in the parietal region, it may occur at any part of the skull. It tends constantly to increase.

(3) *Hernia cerebri.*—This succeeds the removal of a portion of the bone by operation or accident. Its characters are dwelt on elsewhere.

(4) *Dropsy of the brain.*—This tumour is congenital, transparent, soft, fluctuant, and not pedunculated.

ENCEPHALOID CANCER. *See* TUMOURS.

ENCHONDROMA. *See* TUMOURS.

EPIPHYSES, SEPARATION OF. *See* FRACTURE.

EPITHELIOMA. *See* TUMOURS.

**EPULIS.**—A tumour situated on the gum, and connected with the soft parts alone, or with the periosteum also, or with the bone. Many different kinds of tumour are brought under the general designation of epulis. Some of these are simple and others malignant in their character. Generally they are composed of fibrous tissue; but they are occasionally either fibro-plastic or more decidedly cancerous. It is only after ablation, in many cases, that their true nature becomes apparent. They occur most commonly in adults, and may apparently result from the irritation of a decayed tooth. Epulis may be seated on the outer or inner surface of the gum of either jaw; but it is most frequently on the under maxillary bone that we find it. Occasionally it grows from the socket of a tooth, and at other times it so penetrates between contiguous teeth as to force them out of their sockets. It grows along the gum, and projects more or less into the cavity of the mouth, and protrudes the cheeks, causing much deformity. If large, these tumours interfere, by their mechanical effects, with mastication and pronunciation. They frequently shape themselves to the surface along which they grow, and vary considerably in their speed of increase and the size which they attain. Though occasionally pedunculated, they are usually sessile.

The simple epulis is firm, elastic, and fleshy. It is smooth, often knobby to the touch, rarely ulcerated or accompanied by any discharge. The mucous membrane covering it is generally congested and vascular. The sub-maxillary glands are not affected. These tumours are not painful, and generally grow slowly.

The malignant epulis, on the other hand, is softer and more elastic than that just described. It is sessile, and often the seat of lancinating pain. It possesses a large supply of capillary vessels, and occasionally pulsates synchronously with the heart's systole. For the most part, malignant epulis grows quickly; the sub-maxillary glands become implicated, and the tumour ulcerates, and gives out a fœtid sanious discharge. If the growth is large and of some standing, the general health suffers, as is shown by weakness and cachexia. By the above described characters, either form of epulis may be discriminated.

ERECTILE TUMOURS. *See* TUMOURS.

EXOSTOSIS. *See* TUMOURS.

FARCY. *See* GLANDERS.

FIBULA. *See* FRACTURE.

**FOREIGN BODIES** (SOLID) IN THE AIR-PASSAGES.—These are of the most diverse character as regards shape, size, weight, &c. Though, in rare cases, gaining entrance into the air-passages through the soft parts or by ulceration from the œsophagus, foreign bodies are in general admitted through the glottis. It is commonly when, during eating, a sudden and deep inspiration is made, that articles held in the mouth are drawn into the air-passages.

After a foreign body has passed the glottis, a variety of circumstances influences its further progress. If it be pointed and sharp, it may enter the soft parts, and remain fixed at any portion of the windpipe. If of slight specific gravity, it may remain in the larynx; but if heavy, and especially if it be also round, it will probably pass downwards to the lower part of the air-passages, its size then determining to a great extent the limit of its progress. A heavy body will probably remain at rest when it has once fallen downwards as low as it can go; while one of less specific gravity, and smooth round shape, may pass up and down the windpipe during respiration, and may even be thrown upwards into the mouth during a violent expiratory effort. When a foreign body falls downwards in the air-passages, it is most apt to enter the right bronchus. This arises from the anatomical characters of the bifurcation, and the relative size of the right and left bronchi. After entering the bronchus, the size of the foreign body will chiefly determine the distance to which it will penetrate. If irregular in shape, it may adhere anywhere; but if smooth and small, it may pass to a considerable distance towards the periphery of the lung.

The effects which follow the presence of a foreign body in the air-passages will vary according to the nature and position of the body. If the extraneous substance be soluble, it may disappear in a short time; if chemical, it may act most destructively as it dissolves; if capable of absorbing moisture, it may greatly enlarge in size. As to position, the most dangerous is, of course, the glottis, where a foreign body may cause instant suffocation; next, the ventricles of the larynx; next, the trachea; and lastly, one of the bronchia.

The irritation caused by a foreign body in the air-passages, is apt to set up inflammation of a very insidious kind. This inflammation may either be limited in extent, or spread far and wide, and ulceration and disorganization of the lung may follow.

*Symptoms.*—In rare cases the entrance of a foreign body into the air-passages produces very little annoyance either at the time or for long afterwards. In the vast majority of cases, however, the result is very different. If death by suffocation do not immediately take place, most distressing irritation and spasm are caused—dyspnœa of the most urgent kind—spasmodic cough, occurring in violent paroxysms—pain, possibly at a limited part of the throat, or at the upper part of the sternum—faintness, and, it may be, a discharge of blood by the mouth and nostrils. If the body be at all large, a sensation as of instant dissolution comes over the patient. He puts his hand to his throat, as if he would remove the impediment to his free respiration—he remains if possible in the erect posture —the eye-balls become prominent and the face livid—tears flow over the cheeks, and the voice is altered or lost. Attempts are made to vomit, and occasionally there is involuntary discharge of fæces and urine. There is great mental anxiety, and this we read graphically depicted in the patient's face. Fainting may take place, and consciousness not be recovered for some time. If the straining be great there is occasionally rupture of some of the pulmonary cells, and emphysema of the neck or pneumothorax may be added to the other features of the case.

Such violent symptoms as have been detailed may pass off after an interval, and comparative quiet may follow, leading to a delusive opinion of the case. At varying periods the formidable train of symptoms above sketched recur, leaving, during their abeyance, a feeling of great anxiety and insecurity. In some cases the period of intermission is of considerable length; in others, hardly any cessation marks their progress for days together. The amount of irritation occasioned, and the violence of the consequent spasm, will, in a very considerable degree, depend on the position occupied by the foreign body. The higher up it lies the greater the distress it will cause, in consequence of the more sensitive nature of the lining membrane in the upper, as compared with the lower, portion of the air-passages. It is chiefly when in its movements the foreign body impinges against the laryngeal surfaces, that the violence of the symptoms is urgently increased; and it is often from the spasm thereby produced, more than from the mere mechanical action of the agent, that suffocation follows the passage upwards of the intruder, and its impaction in the neighbourhood of the glottis.

The pain caused by the presence of a foreign body will vary chiefly with the rapidity and complete nature of the obstruction caused to the respiration. Sometimes it appears hardly to exist, at other times it is very severe. A copious expectoration of thin or thick, purulent or bloody sputa, is generally present, and the marked alleviation of all the distressing symptoms by one particular posture, is a feature of account in some cases. In other instances, all positions and postures are alike futile in obtaining a moment's comfort or relief.

The mechanical obstruction caused by the foreign body, or the inflammation it sets up, diminishes or wholly suppresses the respiration in a portion of the lungs. The stethoscope enables us to determine this, together with, it may be, other points most important in their diagnostic relation. Puerile respiration in some parts, enfeebled or suppressed murmur in others, musical notes of various kinds caused by the passage of air by the side of the foreign body, or through it, as in Macnamara's case, in which a whistling sound was caused by the air passing through a perforated plum-stone.

The pleximeter, too, adds here much to our knowledge. If air be imprisoned and at rest in a portion of the lung, a clear note will result from percussion; but if inflammatory action has taken place, followed by consolidation, then dulness on percussion will be met with. The sound in the former case is sometimes abnormally clear. The movement of the ribs, too, will be absent, if a considerable portion of a lung be inactive. By means of auscultation and percussion, then, the point of impaction can be frequently recognized, as we can determine how much and what portion of the lung is shut off from communication with the trachea. The movement of the foreign body within the trachea may occasionally be clearly heard by the stethoscope, and felt also by the application of the hand. This, however, can of course alone occur when impaction has not taken place, and when the augmented secretion has not glued it to one spot. It can only be expected in the case of bodies of a certain size, shape, and weight, and is most marked during strong expiration.

The inflammation which is so apt to follow the presence of a foreign body, may arise very shortly after its admission, or be delayed. The period of its advent, and its intensity, will depend chiefly on the degree of irritation caused. It may be limited in its seat to the bronchial tubes, or extend to the whole respiratory organs. If the cause of the morbid action remain in activity, death may follow by a train of symptoms in every way analogous to those of phthisis, and any of the many pathological conditions found in disease of the bronchia and lungs may be discovered after death.

The diagnosis of foreign bodies in the air-passages is sometimes far from easy. In the case of children, they may be too young to give an explanation of the accident, or from fear or ignorance they fail to afford any information. Young persons forget that they held any foreign body in their mouths at the moment they were startled, and if the first effects have subsided before the surgeon sees them, it is supposed that the intruder has been expelled, or that it has been altogether a false alarm. The medical attendant in all cases in which symptoms such as those before described set in suddenly in a child previously in good health, may suspect that some foreign body has passed into the air-passages, and direct his inquiries accordingly. He should try and discover of what nature the foreign body is likely to be, and by auscultation and percussion seek for evidence of its point of penetration. The *history* of the case—the mode of attack—the previous state of health of the patient—the nature and size of the extraneous object—are all matters of the utmost consequence, and should be accurately ascertained. If the object is large, it will probably lodge in the gullet—if sharp and irregular, it may have become entangled in the folds of the pharynx or glottis—if small and smooth, it may have passed into the windpipe. The movements of the body may be sought for, if we have reason from its nature to expect them. The information to be obtained by the use of the stethoscope and pleximeter has been already alluded to. It may be added that the absence of respiratory murmur from a lung, or a portion of a lung, and its sudden re-establishment, is very characteristic and decisive of the accident under review.

If aphonia is marked, or the voice and respiration is very croupy, and if the pain is seated in the upper part of the windpipe, and the spasm be severe and constant, while no morbid sounds can be detected in the chest, we may be pretty confident that the foreign body is impacted in the larynx; while, if the movements of the body can be distinguished in the trachea, or a certain portion only of a lung is affected, we can in like manner recognize the seat of obstruction. It is, however, right to remark, that it is not alone in those cases in which the foreign body is impacted in the larynx, that decided modifications of the voice are observed; nor is it always the case that the introduction of a foreign body into the ventricles of the larynx causes a train of very severe symptoms; still, in general, an opinion may be safely grounded upon these two circumstances—the influence on the voice, and the severity and persistence of the symptoms, as to the position of the intruder in the larynx. A few cases are on record, in which, after the outset, symptoms of no moment have followed the presence of a foreign body low down in the trachea.

The presence of a foreign body in the air-passages is distinguished from *croup*, by the greater suddenness of the attack—by the irregular, but pretty perfect nature of the intermissions in the progress of the affection—by the seat of the pain and obstruction shifting, if the foreign body is not fixed, or the limited nature of the portion of the respiratory organs affected, if it has become impacted low down—by the expiratory effort being in general that most embarrassed, and by the less loud and stridulous character of the breathing, and the dryness of the cough. Lastly, we have signs of inflammatory fever attending croup from the first.

*Œdema of the glottis* may be at once recognized by digital examination, and the history of its advent and progress, while foreign bodies in the pharynx or œsophagus may be detected by the finger or a probang, and in the case of such impaction the deglutition will be affected as well as the respiration. If the body be large or sharp it will, as before remarked, probably be found in the gullet, and the appearance of a circumscribed tumour in the neck will further confirm that opinion. *Hooping-cough* may be recognized by the history of the case, the peculiar " whoop," and the difficulty being chiefly during inspiration, and the spasm of the glottis.

**FRACTURE**, or a sudden solution of continuity of a bone, may result from external violence, directly or indirectly applied to the part, or from muscular contraction. Each and all of the various fractures may arise from direct violence, while from

*Indirect* violence we may have fracture of the *base of the skull*, *upper jaw*, *sternum* (as from blows on the back, or yet more rarely, from falls on the head, nates, or feet); *clavicle*, as in falls on the hand, elbow, or shoulder, when the arm is removed from the side; *humerus*, falls (rare however) on the elbow or hand when they are carried from the trunk; *radius*, as its lower end, in falls on the hand, especially on the palm and thenar cushion; *ulna* and coronoid process, in falls on the hand, especially on the hypo-thenar side; *ribs*, *acetabulum*, in falls on the feet or knees; *spine*, in falls on the head, feet, or nates; *femur*, within or without the articulation and in the shaft, from trips, falls on the feet or knee; *tibia*, in twists of the foot; *fibula*, at its lower end, in falls on the inner edge of the foot, or in sudden twists of the foot outwards; *leg*, both bones, in falls on the feet.

From *muscular contraction* alone we may have fracture of the shaft, or great tubercle, or inner condyle, of the humerus; both bones of the fore-arm (very rare); the coronoid process of the ulna; the olecranon; the lower jaw; the ribs; sternum; clavicle; hyoid bone, shaft of the femur, patella, &c.

A fracture may pass *transversely* across a bone, divide it *obliquely* or *longitudinally* (splitting), or it may produce a combination of these injuries. In the young, as a result of direct violence, we have usually a transverse fracture; in the old, and on the application of indirect violence, an oblique fracture generally results. A longitudinal fracture is rare, and commonly arises from direct and concentrated violence.

A fracture may be complete or incomplete. The latter is occasionally and most commonly seen in the fore-arm of children, and also in the clavicle and leg, and more rarely in the arm and thigh. Fractures, too, may be simple or compound, comminuted and impacted (*i.e.* one fragment driven into the other), &c.

When a bone is broken, the violence which gave rise to it, the weight of the body or of the part (no longer supported as formerly), and the influence of the muscles in voluntary or involuntary action, and it may be the effect of renewed or fresh external violence, cause the fragments, especially the lower, to undergo displacement from their normal position and axis; and thus the most characteristic features of a fracture are produced. There is least disposition to such displacement in transverse fracture, and most in oblique, for obvious reasons. It is the inferior fragment which chiefly undergoes displacement. These displacements it is requisite to bear in mind in examining any case. They are as follows:—

(1) *Displacement in the length of the bone.*—(*a*) Shortening; (*b*) riding; (*c*) impaction.

(2) *Displacement in the axis of the bone.* Fragments forming an angle.

(3) *Displacement in the circumference.*—Rotation of one or both fragments on their own axis.

(4) *Displacement laterally,* when one fragment, though not freed or passing wholly beyond the other, as in (1), is displaced to the side.

(5) Separation of the fragments (patella, olecranon, os calcis).

Several of these displacements may be combined.

The sooner after the accident our examination is made the better, before swelling, tension, and irritation have become established. The displacements above noted may be, in many cases, recognized by the eye, but usually the hand most clearly identifies them.

In investigating any obscure case of fracture it is most important to learn how the patient fell, and what part was struck at the time of the accident. In this way alone we may be able to distinguish between two accidents having similar features. If the fracture be in one of the limbs the corresponding bones should be carefully compared, and diligent inquiry made as to the pre-existence of any deformity, or previous fracture or disease of the bone. If this precaution is not taken in obscure or old cases very grave errors may be committed.

In all instances it is well carefully to observe the appearance, outline, and attitude of the part, and to compare it with the corresponding part, before any manipulative tests are applied to determine the exact nature of the injury. In any difficult case, repeated investigation should be had recourse to before an opinion is given. The character of the fracturing force, its direction, and its relative power, as regards the bone broken, should always be taken into account.

The signs which evidence the presence of a fracture are either *sensible* or *rational*. Of the former we have deformity, unnatural mobility, crepitation, swelling, and discoloration; of the latter, pain and loss of function.

A. **Deformity** of the part, and it may be of the segment of the body in which the broken bone lies, or it may be in the attitude of the whole trunk. There is a change in the shape or contour of the part. This will be the more evident, in the case of limbs, on comparing corresponding members. There may be irregularities, hollows, or projections, shortening, increase of lateral dimensions, curvature, &c. The part may be deformed in consequence of the existence of any of the displacements before described.

In incomplete fracture deformity may be the only sign, and in impacted fracture it is often the most apparent feature.

B. **Unnatural Mobility** at the place of fracture. There is motion at a point where there should be none. This is best shown, by fixing the one fragment, and rotating, or otherwise moving the other. If the one fragment is very short, and especially if the fracture is near a joint, or if there be two bones, one of which alone is broken, or if the bone is one firmly fixed, or if there be impaction, then it is very difficult to make out this sign.

C. **Crepitation**, *i.e.* a sound or sensation of rough grating, when the fragments are rubbed together in opposite directions (see p. 31). This will not be apparent unless the fragments come into contact, and it will continue only so long as they are still rough and irregular. It is most evident in superficial bones, and shortly after the accident. It may be absent in fracture of the cancellous ends of long bones. After a time it cannot be developed. If the bone is covered by thick muscle, as the ribs, efficient aid may be got from the stethoscope. It may be developed in some cases, by simply moving the fragments in opposite directions, or by fixing the upper fragment, while the lower is moved, laterally, flexed, extended, or rotated. In large limbs the fixture of the upper, and the movements of the lower fragments should be performed by assistants, while the surgeon applies his hand to the suspected part. Crepitation is not observed in impacted fracture. When the fragments are much separated or riding, or if any foreign body is interposed between them, it cannot be made out.

D. **Loss of Function.**—The part cannot be used as formerly. This may, however, depend on dislocation or mere contusion and temporary paralysis. If the fracture is impacted, or if the fragments are wedged together, the patient may retain a certain amount of power over the limb, and the same may be observed when only one of two parallel bones is broken.

E. **Pain, Swelling, and Discoloration** of the part. Pain, increased by movement and pressure, if persistent and fixed at a spot, and especially if that spot was not struck, must be looked upon with great suspicion. Swelling and discoloration show the amount of violence which accompanied the fracture, and the point to which that violence was applied. They are more or less seen in fracture by indirect violence. Phlyctenæ or bullæ are common accompaniments of fracture of the leg.

These various signs of fracture, if combined and distinct, give unequivocal evidence of the existence of the lesion.

In impacted and incomplete fractures, the unnatural mobility and crepitation will probably be wanting, or the latter sign may be present, but very obscurely developed ; but in complete unimpacted fracture, these two signs—unnatural mobility and crepitation—are the most valuable and unequivocal of all.

The patient, or even the by-standers, may hear a crack at the moment the fracture occurs ; and this, with the consciousness of something having given way, may find a place in our consideration of any given case, it always being requisite to judge of such statements with caution, as not being unfrequently a mere figment of the imagination.

Fractures in the neighbourhood of joints are those in which the greatest difficulty is met with in recognizing the accident. Their distinctive features are described elsewhere. In considering the symptoms of the various fractures, the five signs above described will be referred to in the order in which they stand above.

ACROMION.—May be broken at its tip or base, and that by direct or indirect violence. Falls on the hand or elbow, the arm being close to the side, may cause it to give way. The displacement may be very slight, or the fragment may be carried downwards on the outward surface of the arm; or remain at its old level, and form an angle with the part of the bone from which it has been broken off. The distance between the tip of the shoulder and the sternum is diminished. The patient inclines his head to the affected side, and often carries his arm in the opposite hand.

**A. Deformity.**—When the tip is broken off, the point of the shoulder, and consequently its round contour, will be destroyed. This is best seen on looking at the joint from behind. The shoulder is sunk; but by raising and pushing up the elbow, its roundness is restored. The detached fragment may be felt displaced downwards, and it can be hooked up by the finger. If the finger is run along the spine of the scapula, it suddenly discovers the void at the place of fracture.

When the fracture is quite at the base of the process, the displacement may be very slight, and the place of fracture only recognized by careful palpation with the finger.

**B. and C. Unnatural Mobility and Crepitation.**—If the fragments are displaced, these signs will be apparent on grasping the depressed portion, and raising and moving it while the arm is carried away from the side, so as to relax the deltoid; or by raising the elbow and rotating the arm with one hand, while the other is pressed over the shoulder. When the fracture is at the base, these signs are difficult to recognize; but by raising and depressing the arm, they become evident.

D. **Loss of Function.**—The arm cannot be raised. It often hangs powerless, or retains its antero-posterior movements alone. The fore-arm is frequently supported in the other hand. The hand cannot be placed on the crown of the head.

E. **Pain, etc.**—The pain is usually fixed and severe; and the swelling and discoloration will be considerable, if the fracture was caused by direct violence.

This fracture may be confounded with that paralysis of the deltoid which so frequently attends violent falls on the shoulder; but the loss of the tip of the bone, or the irregularity at its base; the crepitation and mobility; and the retention in general of more movement, will distinguish fracture of the acromion from the accident referred to.

CLAVICLE.—This is a very common fracture. It may be produced by direct or indirect violence; rarely, also, it occurs by muscular contraction. Falls on the hand or elbow, when they are removed from the trunk and the joints fixed, and falls on the shoulder (in which case it is generally at the centre of the bone), are common causes of this fracture. It may be transverse or oblique, complete or incomplete, comminuted, simple, or compound, &c. The displacements may be either as to length, axis, or laterally.

*Complete fracture within the coracoid process, i.e.* in its inner two-thirds. It is here usually oblique.

A. **Deformity.**—Commonly evident. There is generally projection of the outer end of the inner fragment, and sinking of the inner end of the outer, which passes towards the sternum and usually lies below, and may (though rarely) be placed above or anterior to the inner fragment. This displacement is evident to the eye and hand; and, as a result, the contour of the part is changed. The shoulder is sunk, and approximated to the middle line of the trunk. The bone is shortened. The head and body are inclined to the injured side. The arm is rotated inwards, and hangs by the side; the fore-arm is usually supported by the opposite hand, or the elbow is fixed on the hip. If the fracture is transverse, the displacement may be slight, and then all these signs which depend on such displacement will be modified or wanting.

B. and C. **Unnatural Mobility and Crepitation.**—Evident on raising and sinking the arm, the shoulder being drawn backwards and raised.

D. **Loss of Function.**—Movements of the arm restricted or lost, especially elevation and circumduction. To this remark, however, striking exceptions occasionally occur. The hand can very seldom be put up to the head.

E. **Pain, &c.**—The pain is usually considerable, especially on trying to raise the arm and carry it across the body. There is usually some swelling; and if the fracture has been caused by direct violence, the discoloration may be very great, extending up to the neck and down on the chest. When the fracture has been caused by indirect violence, the discoloration may be found on the shoulder, elbow, or hand.

*Fracture without the coracoid process*, *i.e.* in the outer third of the bone, and between it and the acromion. If the fracture is placed between the acromio-clavicular articulation and the strong ligament which connects the clavicle and coracoid process, then the outer fragment is considerably displaced, so that the outer end falls downwards and inwards, and the inner end is drawn by the trapezius upwards and outwards. This condition of things will produce a deformity easily recognized. In a much rarer form of fracture, in which the bone gives way within the area of attachment of the coraco-clavicular ligament, there is no displacement, and consequently no deformity.

A. **Deformity.**—If the finger is carefully run along the bone, some irregularity may be discovered in many cases, though in some it is difficult to make it out.

B. and C. **Unnatural Mobility and Crepitation.**—Very obscure. By raising and depressing the arm while the finger is kept on the outer end of the clavicle, or by pressing the fragments in opposite directions and by restoring the displacement, these signs may be obscurely rendered.

D. **Loss of Function.**—If no displacement exists, there will be little loss of function.

E. **Pain, etc.**—The pain is usually marked and fixed, and there may be discoloration.

It is, then, by the mode of fall, the irregularity to the touch (if no greater displacement), the fixed and it may be the slight mobility, loss of power, and crepitation, together with the absence of any other fracture, that we recognize a clavicle broken outside of the coracoid process, when such fracture is not attended by displacement. When there is displacement, the length of the clavicle will be diminished, and the shoulder will be approximated to the middle line of the body.

Fracture of the outer end of the clavicle has been mistaken for dislocation of that bone from the acromion. They are to be distinguished by observing the exact seat of disunion, whether it be at the place of the articulation of the bones or a little way from it towards the sternum ; and if there is difficulty in deciding this, then careful measurement must be made between the sterno-clavicular and acromio-clavicular joints on the sound side, and a comparison instituted between it and the distance which is found to exist between the sterno-clavicular articulation and the projection on the injured side. If it be a dislocation, the measurement will agree; while if it is a fracture, the distance will be diminished on the injured side.

COCCYX.—Usually by direct violence. Falls, blows, and parturition are the usual causes. If there is displacement, it is by the lower fragment being carried forward towards the rectum, and an angle being thus formed.

A. **Deformity.**—Irregularity in the bone felt posteriorly by external examination or per anum.

B. and C. **Unnatural Mobility and Crepitation** may be apparent when the finger is introduced into the bowel and the bone grasped.

E. **Pain, etc.**—The pain is very great, especially on bending or on defecation, and swelling and discoloration may be evident also if the accident has been caused by direct violence. If the bone is much pressed in and displaced towards the bowel, the function of the rectum may be interfered with.

CORACOID PROCESS of the scapula. This is a rare fracture, and occurs by direct violence. When broken, the process may be carried downwards and inwards if the coraco-clavicular ligaments are ruptured, and it may be felt in its new position. This, however, seldom happens. Crepitation and abnormal movement may be felt when the finger is pressed over the process and the arm raised. The fore-arm cannot be flexed.

It is more by exclusion—by seeing that there is no fracture of the other processes and bones in the neighbourhood—that we are led to suspect this fracture. If pressure over it causes no pain, and if the fore-arm can be bent, then the coracoid process can hardly be broken.

EPIPHYSIS, Separation of, by traumatic causes.—This accident is almost confined to childhood, and is a very rare affection, as Marjolin's extensive experience at the "Hôpital des Enfants Malades" has shown. It very seldom is seen after fifteen years of age, and rarely after eight. It is a much rarer affection than is supposed, the fracture being usually in the body of the bone, near the line of the epiphysis. Experiments on the dead have proved the same thing. The signs of this accident are those of transverse fracture near a joint. The upper and lower ends of the humerus (especially the lower), the lower end of the radius, and the upper and lower end of the femur and tibia, are the parts in which it is most commonly met with.

FEMUR.—(1) The upper end, (2) shaft, (3) lower end.

I. *Upper end.* Neck. (*a*) Within the capsule, (*b*) without the capsule.—These fractures are sometimes very difficult to recognize, and easy of mistake. Their just and true diagnosis requires the presence of most of the signs hereafter enumerated. We cannot rely on the various signs separately; they must be taken collectively.

(*a*) May be simple or impacted. This accident is almost confined to the aged, and is more common in females than in males It arises (though rarely) from falls on the great trochanter, trips, or a false step in walking, slipping off the curbstone or from the step of a stair. The fracture is transverse or oblique; sometimes it is "mixed," *i.e.* passes partly outside of the line of insertion of the capsule.

A. **Deformity.**—The displacement is frequently very slight; at other times the lower fragment is carried upwards and backwards, and is rotated outwards or inwards; and from the size of the limb and the depth of the part the deformity is occasionally not great. The displacement is as to length and circumference. The lower fragment is drawn upwards and outwards, and rotated outwards. The hip is somewhat flattened. The upper and outer part of the thigh are more convex and tense than usual. The knee is slightly flexed and turned outwards. The thigh is somewhat shortened (from a quarter to one inch), perhaps not at first, but after a time; and occasionally this shortening augments suddenly. The shortening bears a certain proportion to the amount of rotation outwards. The greater and more persistent the rotation, the more marked the shortening. In old fractures the shortening may be very considerable. By extension it can be removed. The trochanter major lies a little higher and farther back than normal, and it is less prominent. Rarely the knee and foot are inverted, more rarely still does the foot point straight forwards. The heel lies behind the inner malleolus of the opposite leg, and the limb lies on its outer side.

B. **Unnatural Mobility.**—The movement at the joint is freer than it should be, and the trochanter major revolves in a shorter radius than before, being diminished in proportion to the amount of bone broken. There is passive movement in all directions.

C. **Crepitation.**—Apparent after extension is applied sufficiently to replace the lower fragment, and bring the rough surfaces into contact, and the limb is rotated by an assistant while the surgeon presses his hand over the trochanter. It is frequently very difficult to detect. The absence of crepitation does not prove that there is no fracture, as various conditions may prevent its development.

D. **Loss of Function.**—Usually decided, but occasionally there are curious exceptions to this rule, in which the patient has been seen to stand and even walk after such a fracture.

Generally the limb cannot be raised when the patient is in bed without the aid of the toe of the other foot, or his grasping the limb with his hands. Extension remains, and rotation outwards, but not rotation inwards or flexion, except to a very limited degree.

**E. Pain, Swelling, and Discoloration.**—The pain in the haunch behind the trochanter and in the groin is considerable on movement, but in some cases it is little complained of. The swelling is slight, and the discoloration over the trochanter is observed only in such rare cases as are due to falls upon that part. The symptoms are still more marked when the patient is in the erect posture.

(*b*) *Extra-capsular.*

(α) Simple. (β) Impacted.

(α) *Simple.*—Occurs generally in persons between thirty and fifty years of age, but may be met with at any age. It is produced by falls on the trochanter major, the anterior surface of the thigh, knee, and foot.

When there is no penetration into the joint, and the fracture is incomplete, then the displacement will be as to length and circumference. The shaft is drawn upwards and backwards, and the limb rotated outwards.

**A. Deformity.**—The upper part of the thigh is increased in girth. The thigh is shortened, and that at once to the full amount that it will reach, and the whole limb everted (rarely inverted, but more commonly so than in intra-capsular fracture; more rarely still it is straight). The trochanter is seldom less prominent than on the opposite side, sometimes it projects more. It is carried backwards and upwards. The limb can be easily drawn to its normal length, and restored to its axis; but on the removal of the applied force it quickly resumes its abnormal position.

**B. Unnatural Mobility.**—This is evident on passive motion being applied, the pelvis being fixed and the limb rotated. If the patient be laid flat on his face in bed and the ankle seized, the limb can be carried upwards considerably higher if there is a fracture, than when the neck of the bone is entire.

C. **Crepitation.**—When the limb is drawn downwards and rotated, this is apparent. Crepitation is frequently easily developed without traction.

D. **Loss of Function.**—The use of the limb is lost, and the trochanter turns on the axis of the femur alone.

E. **Pain, Swelling, and Discoloration.**—The pain is great, especially on motion (voluntary or communicated), and pressure over the trochanter. There is frequently much swelling if the accident has been caused by a fall on the trochanter, and there will then be ecchymosis (frequently very extensive), and contusion also.

(β) *Impacted Extra-Capsular Fracture.*—When the impaction is complete, the neck is driven into the cancellous tissue of the trochanter. The axis of the limb is little changed. There may be little or no eversion; very slight shortening; and the loss of function may not be so great as to prevent the patient raising the limb without aid when in bed, and even walking on it, though lamely and painfully. Crepitation is not procurable, as the fragments are locked, and the limb cannot be drawn to its normal length.

The mode of fall; the want of prominence in the trochanter; the pain, swelling, and ecchymosis; the slight shortening, and the embarrassment of function—are, in such cases, our only guides.

If the impaction is incomplete, then the head of the bone may be turned backwards behind the shaft, and the limb everted. In rarer cases of extra-capsular impacted fracture the limb is inverted.

Extra-capsular fracture of the femur is distinguished from mere *contusion* of the hip by the fact that in the latter the shortening is only apparent, not real, as can be shown by careful measurement, when the anterior superior spinous processes of the ilium are placed scrupulously on a plane, and the two limbs parallel. The trochanter major is not less prominent than usual, though masked by swelling and discoloration. The rotation outwards is not so decided, nor is in general the loss of function. Though causing great pain, the patient can frequently, in the case of mere contusion, rectify the position of the foot by a violent effort. After a few days' rest, the evidence of injury in mere contusion will, in a great measure, disappear; while, in fracture, some of the signs of its presence will be, on the contrary, rendered more evident.

In chronic rheumatic arthritis, if a fall is sustained on the trochanter, most of the signs of impacted fracture (shortening, eversion, changed position and relationship of the trochanter, loss of function, &c.), are present; but the history of the case, the pre-existence of stiffness, pain, &c., in the joint; the slow establishment of the disease; and the effects of rest (in dissipating in a great measure the effects of the one and not the other), will distinguish them. If the knobby growths which are apt to form round the joint in chronic rheumatic arthritis are present, and can be felt, they will assist us to discriminate it. If the disease be present in other joints also, we will have further aid. There is no crepitation or power of restoring the limb to its length in either affection, nor is there increased mobility; while the patient may also have walked or stood on the limb.

*Differential Diagnosis between Intra- and Extra-capsular Fracture.*—The following signs have been supposed, since the time of Sir A. Cooper, to distinguish these two accidents; but later observations have greatly diminished their value, and we now believe that in most cases the distinction between these fractures is not to be made at all, and that in a few instances we can only surmise with more or less plausibility which has occurred.

| | **Intra-capsular Fracture.** | **Extra-capsular Fracture.** |
|---|---|---|
| 1. *Age.* | Rarely before 50. | All ages, but mostly between 30 and 50. |
| 2. *Sex.* | In the female most. | Equally in both. |
| 3. *Cause.* | Frequently slight, indirect violence. A trip or false step. (A fall on the trochanter very rarely the cause.) | Severe and direct violence. A blow on the trochanter, anterior part of the thigh, or a fall on the foot or knee. |

### 4. *Deformity.*

| | |
|---|---|
| Slight shortening at first (very rarely over an inch), but afterwards it may be considerable. This increase may occur suddenly. The prominence of the trochanter is diminished, and approached to the crest of the ilium. | If there be no impaction the amount of shortening is marked at first (may be as much as one and a half or two inches). It is more so than in fracture within the joint. The shortening changes little afterwards. The trochanter may be a little displaced upwards and backwards. Its prominence is not diminished unless there be impaction. If there is impaction there may be no shortening. |

### 5. *Unnatural Mobility.*

| | |
|---|---|
| Marked in the socket of the joint. | If no impaction, this is marked, but not at so deep a point as in fracture within the socket. If there is impaction, this is not observed. |

### 6. *Crepitation.*

| | |
|---|---|
| Obscure, and only on drawing the limb to its normal length, and rotating it. | Little or no extension needed to develop it on rotation. Easily apparent if there is no impaction. |

### 7. *Loss of Function.*

| | |
|---|---|
| Usually decided, but occasionally partially retained. The trochanter moves on a shorter axis than usual, but has still part of the neck of the bone as a radius. | Decided if there is no impaction. The bone turns on its own axis. |

### 8. *Pain, &c. &c.*

| | |
|---|---|
| Slight, but deeply placed. Swelling and discoloration over the trochanter usually absent. | Superficial, and especially above and behind the trochanter, and usually severe on any movement or pressure. Swelling and discoloration over the trochanter usually marked. |

As to *old fractures*, while in the extra-capsular species the functions of the limb are much restored, so that the patient can walk firmly and move the bone in the articulation, and while the nutrition of the limb is not affected, and the shortening not greater than it was at first; it is different in the intra-capsular fracture. In that kind of fracture it is long impossible for the patient to walk at all, and when he does he is very lame. There is no movement in the articulation, though there may be a simulated one in the loins. The limb wastes and the shortening increases during the progress of the case.

DISTINCTION BETWEEN IMPACTED FRACTURES.

| **Intra-capsular.** | **Extra-capsular.** |
|---|---|
| 1. *Violence.* | |
| Comparatively slight and indirect. | Generally great and direct. |
| 2. *Eversion.* | |
| Considerable. | Slight. |
| 3. *Crepitation.* | |
| Frequently present. | Absent, and very obscure. |
| 4. *Traction.* | |
| Restores the normal length. | Ineffectual in removing the deformity. |

*Great Trochanter*, Separation of.—This may occur in connexion with extra-capsular fracture, and in very rare cases the trochanter has been alone separated from the shaft. It is caused by direct violence, and is evidenced by—(1) The absence of its accustomed projection, while it can be felt higher and further back than normal. It is (2) movable in its new situation, but does not rotate with the shaft. There is a space between it and the shaft observable when it is raised. (3) Crepitation can be produced when the process is pushed downwards, and an assistant rotates the shaft. (4) Abduction is difficult or impossible. (5) There is pain, swelling, and discoloration at the outer part of the haunch.

II. *Fracture of the shaft of the femur.*—Direct blows or falls on the knee or foot. May be transverse or oblique (the last most common), simple, compound, comminuted, &c.

A. **Deformity.**—In fractures close below the lesser trochanter the displacement is chiefly in the axis, and by rotation. In fracture lower down we may have any form of displacement; but that as to length and by rotation are most common. In fracture just below the lesser trochanter, the lower end of the upper fragment is tilted forward by the psoas and iliacus, and it comes to project in the groin. In oblique fractures lower down the inferior fragment is carried to the inside and behind the upper, and the limb is rotated outwards. Such displacement will augment the girth of the thigh, which is also shortened; and it not unfrequently happens, in consequence of there being displacement as to the axis also, that the lower part of the limb does not correspond in direction to the upper.

The projections caused by the ends of the fragments may also usually be felt.

B. **Unnatural Mobility.**—Easily developed.

C. **Crepitation.**—Marked when the upper fragment is held by the surgeon and the limb extended and rotated by an assistant.

D. **Loss of Function.**—The limb is powerless.

E. **Pain, Swelling, etc.**—Pain complained of, especially on all movement. Occasionally there is discoloration. The girth of the limb is augmented.

III. *Fractures of the lower end of the femur.*—We may have both condyles broken off from the shaft, or one only, with or without splitting, extending into the joint. It may be transverse or oblique. Usually the result of direct violence or falls on the knee.

A. **Deformity.**—In transverse fracture of both condyles, the displacement of the fragments may be very slight, or the lower fragments may be drawn backwards, and project in the popliteal space. In oblique fractures the lower fragment may pierce the soft parts above the patella. The degree of deformity will depend on the displacement, and may thus be very slight or very apparent.

B. and C. **Unnatural Mobility and Crepitation.**—Easily made evident.

D. **Loss of Function.**—Marked.

E. **Pain, etc.**—Much pain, swelling, and discoloration, the contusion being generally severe.

When one condyle alone is broken off, the change of shape and contour in the part, the unnatural mobility and crepitation produced on moving it, and the pain—will clearly point out the lesion.

When the condyles are split asunder, the patella sinks between them; the joint is flattened and broader than usual; the crepitation is very apparent on slight pressure or movement; and the use of the limb is lost.

For the distinction between fracture near a joint and dislocation (see p. 182).

FIBULA.—When broken by itself in its upper two-thirds it is by direct violence; and from the way in which the bone is supported by the tibia, it is not always easy to recognize the fracture, if it is not comminuted; but by pressure with the fingers along the outer aspect of the leg, unnatural mobility and obscure crepitation can be discovered; while the history of the case, the severe fixed pain at the spot, the swelling and discoloration, will indicate the presence and seat of the fracture.

*Lower third.*—Direct and indirect violence. Falls on the inner edge of the foot, by which the foot is twisted outwards, or sudden wrenches of the foot in the same direction ("fracture par divulsion"), or a fall on the outer side of the foot, by which the sole is twisted inwards ("fracture par arrachement"), or a sudden twist of the toes inwards.

A. **Deformity.**—The toes are turned outwards and the heel inwards, if the fracture is situated a short way above the malleolus. If it is placed close above then there may be no such deformity. Sometimes, though much more rarely, the whole sole is everted. There is a sudden hollow or irregularity a short way above the external malleolus. The internal malleolus is prominent if the foot is twisted. In fractures by violent abduction the malleoli are frequently separated notably, so that the breadth of the articulation is increased.

B. and C. **Unnatural Mobility and Crepitation.**—Are evident when alternate pressure is made on either side of the seat of fracture, or when the lower part of the leg is fixed and the whole foot moved laterally, or when, the leg being fixed, the toes are carried alternately outwards and inwards.

D. **Loss of Function.**—Standing or walking are difficult or impossible.

E. **Pain, Swelling, etc.**—Fixed pain at the point of fracture, increased by pressure over the fracture. All movements of the ankle, especially adduction of the foot, cause great pain. The swelling and discoloration are usually marked around the external malleolus.

To distinguish such a fracture from a mere sprain is not always very easy, from the support given to the fragments by the tibia preventing us from observing any increased mobility or crepitation; but, generally, the severity of the violence; the acuteness of the pain at a fixed spot, and its remaining persistent; the tendency to displacement of the foot; the irregularity in the bone; and, on fixing the leg and rotating the sole well inwards, or moving the toes freely outwards and inwards, unnatural mobility and crepitation will be made apparent.

FORE-ARM.—Both bones. Usually at the middle or in the lower half. Caused by direct violence, or by indirect, such as falls on the palm of the hand. Generally both bones give way at the same level, but this may not be the case. The displacement is towards the centre line of the arm; lateral; in the axis; or it may be slightly in the circumference. The radius is sometimes rotated. There is seldom much shortening.

A. **Deformity.**—The outline of the fore-arm is changed. There is a hollow at the place of fracture. The muscles do not stand out prominently, as usual, along the border of the fore-arm. There may be an angle at the part where the fracture exists. The hand is sometimes pronated, and cannot be supinated.

B. C. and D. **Unnatural Mobility, Crepitation, and Loss of Function.**—All marked. Supination and pronation lost.

E. **Pain, Swelling, etc.**—Generally decided also. When the lower ends of both bones are broken at the same level close above the joint, the distinction between it and dislocation of the carpus backwards is made, by observing the ease of reduction and the immediate reproduction of the deformity, so soon as the extending force is removed. By the crepitation and increased mobility which belong only to fracture; by the styloid processes retaining their relationship to the carpus, and moving with the hand; and by a careful measurement from the extremity of the middle finger of the injured hand to the upper margin of the dorsal tumour, and from the same part to the upper edge of the carpus on the sound one, it will be found that in fracture the distance is notably increased, but not so in dislocation.

HYOID BONE.—Fracture of this bone is rare. When it occurs it is by direct violence. It is said, however, to have been produced by muscular contraction.

A. **Deformity.**—The displacement may be very slight, or one of the fragments being driven inward causes the outline of the bone and the contour of the upper part of the neck to be changed. The fragments may form an acute angle.

B. and C. **Unnatural Mobility and Crepitation.**—Are developed by alternate pressure on different sides of the bone. Crepitation only occurs if the fragments touch. Crepitation is also occasionally observed during swallowing.

D. **Loss of Function.**—Deglutition and articulation embarrassed. Sometimes there is imperfect closure of the epiglottis, accompanied by cough, hoarseness, and salivation.

E. **Pain, etc.**—Chiefly in moving the tongue. Swelling and discoloration of the neck generally considerable.

HUMERUS.—I. Upper end; II. Shaft; III. Lower end.

I. UPPER END.—That is, above the point of insertion of the pectoralis major and the latissimus dorsi. In the anatomical neck (intra-capsular), or surgical neck (extra-capsular), of the bone. It may also occur at the epiphysis, *i.e.* immediately below the tuberosities. The head of the bone is sometimes comminuted. Either the intra-capsular or extra-capsular fracture may be simple or impacted; and these fractures may arise from falls or blows on the shoulder when the arm is by the side. They rarely result from falls on the elbow or hand when the limb is removed from the side.

(*a*) *Simple intra-capsular fracture of the anatomical neck.*

A. **Deformity.**—The lower fragment projects slightly to the inner side of the articulation. There is slight shortening of the arm. The shoulder is not so round as usual, and there is slightly increased prominence of the acromion. The elbow can be easily brought to the side, and the hand placed on the sound shoulder.

**B. Unnatural Mobility.**—Is not distinguishable.

**C. Crepitation.**—Obscurely observed on pressing the head of the bone into the socket, the fore-arm being bent and the humerus rotated. Care must be taken not to confound the sensation communicated by the movement of the tendons over the joint with this crepitation. The sensation produced by effusion into the synovial capsule of the joint sometimes closely imitates it.

**D. Motion.**—Lost.

**E. Pain and Swelling.**—Considerable.

(*b*) *Intra-capsular impacted fracture.*—The head of the bone is driven into the cancellous tissue of the shaft, and the tubercles are frequently split.

**A. Deformity.**—The shoulder does not retain its usual contour. There is an unnatural prominence of the acromion, and a shallow hollow a short distance below it. The arm is somewhat shortened. An irregularity is observed in the head of the bone, its entire round shape cannot be felt, and the relationship between it and the shaft is changed. The axis of the shaft no longer runs to the glenoid cavity, but more inwards towards the centre line. The elbow is slightly removed from the side, but can be approximated to it.

**B. Unnatural Mobility.**—Absent.

**C. Crepitation.**—Slightly observable. When the tuberosity is broken also, crepitation is easily produced by fixing the shoulder and rotating the arm. In complete impaction obscure crepitation may sometimes be noticed.

**D. Loss of Function.**—Decided.

**E. Pain, etc.**—Considerable.

*Extra-capsular simple fracture of the surgical neck, i.e.* between the tuberosity and the point of insertion of the pectoralis major and latissimus dorsi. In children the separation is at the line of the epiphysis, immediately below the tubercles. The displacement is in the length and circumference, and possibly also laterally. The displacement in some cases is very slight or absent, but more frequently it is as follows:—The upper fragment is drawn somewhat outwards and forwards by the muscles inserted into the tuberosity, while the lower fragment is drawn towards the axilla by the great pectoral and dorsal muscles. In rare cases the lower fragment has been seen to the outside in front of and behind the upper, in place of to its inner side, as is usual. The head of the bone remains in the socket.

A. **Deformity.**—A short way below the acromion there is an abrupt hollow. Below the coracoid process the rough irregular end of the lower fragment, if it is a fracture, and the round smooth extremity of the diaphysis, if it be a separation of the epiphysis, may be felt, especially when the elbow is drawn from the side and pushed upwards. The arm is shortened if there is riding, *i.e.* if the fragments pass one another; and the axis of the shaft is towards the axilla upwards, inwards, and slightly forwards. The elbow stands out from the side, but can be easily approximated.

B. **Unnatural Mobility.**—The head of the bone does not move with the shaft.

C. **Crepitation.**—Apparent on making extension and counter-extension, while the elbow is carried inwards, and the fragments are brought into contact.

D. **Loss of Function.**—The arm is powerless, but the hand can be placed by the surgeon on the sound shoulder.

E. **Pain, Swelling, etc.**—Often very considerable, if the fragments press upon the axillary nerves. There is frequently swelling in the hand, and there may be discoloration in the axilla, from the rupture of some small vessels. It is with great difficulty that the fragments can be retained in place, as the displacement tends to recur so soon as the extending force is withdrawn.

*Impacted extra-capsular fracture.*—Lower fragment driven into the upper.

A. **Deformity.**—Slight. Perhaps a little flattening of the shoulder, but if there is any swelling this may not be manifest.

B. **Unnatural Mobility.**—Not apparent if the impaction is complete.

C. **Crepitation.**—Obscure on pressing the head of the bone into the socket, and rotating the shaft while the hand is held over the joint; or by firmly grasping the shoulder while an assistant rotates the arm, the fore-arm being bent.

D. **Loss of Function.**—Marked. The use of the arm is lost.

E. **Pain, Swelling, etc.**—Great pain in the shoulder, and frequently much swelling and discoloration.

It is by negative signs we must in many cases be guided. If, after a fall on the shoulder, we have loss of function, slight deformity, and obscure crepitation, and there be no indication of any other fracture or dislocation about the joint, we may suspect that this accident has occurred.

*Splitting off of the great tuberosity.*—Direct violence applied to the anterior part of the shoulder, or violent contraction of the external rotators. The tuberosity is carried outwards and upwards, and the head of the bone passes inwards and upwards. It is generally combined with dislocation forwards.

A. **Deformity.**—The breadth of the shoulder (antero-posterior) is greatly increased, yet the roundness is diminished. The deltoid is somewhat flattened, the finger cannot be inserted into the glenoid cavity, and the acromion is unusually prominent, but yet not so much so as in dislocation. A groove or hollow is apparent between two bony bodies, one of which lies below the acromion, and the other (the round smooth head which rotates with the shaft) to the front and inner side of this, immediately below the coracoid process, where it lies on the edge of the glenoid cavity. The arm is of the normal length. The elbow is separated from the side, but is easily approximated, and the hand can be placed on the opposite shoulder, but with difficulty and by inclining the body.

B. **Unnatural Mobility.**—The fracture being in the axis of the bone the motion is in the line of the humerus.

C. **Crepitation.**—When the fragments are seized with the one hand and the arm moved and rotated with the other, this is observed.

D. **Loss of Function.**—Marked. The arm cannot be raised beyond the horizontal line, though antero-posterior movement remains.

E. **Pain, Swelling, etc.**—Marked.

The differential diagnosis between fracture of the upper end of the humerus and dislocation is given at page 188.

SHAFT OF THE HUMERUS, *i.e.* between the condyles below and the point of insertion of the great dorsal and great pectoral above. The fracture is usually placed at or below the middle of the bone. Transverse or oblique, simple or compound, comminuted, &c. Generally by direct violence, more rarely by falls on the hand or elbow. By muscular contraction fracture is more frequently produced at this part than in any other bone.

A. **Deformity.**—There may be any form of displacement, but riding and angular displacement are the most common.

If the fracture is situated above the line of insertion of the deltoid, the upper fragment is drawn towards the chest by the muscles in the folds of the axilla, while the lower fragment is drawn upwards by the deltoid and passes to the outer side of the lower fragment. In fracture lower down than the insertion of the deltoid the inferior fragment is drawn towards the axilla, and the upper passes outwards and forwards, acted on by the deltoid. In fracture in the lower part of the shaft the displacement is very slight. From a consideration of these displacements the deformity observed in any case is easily understood. If the bone rides, the arm will be shortened; its circumference will be augmented; there may be more or less rotation; the elbow will probably stand in an unnatural position as regards the trunk, and the axis of one part of the limb will not correspond with that of the other.

B. C. and D. **Unnatural Mobility, Crepitation, and Loss of Function.**—Are marked and evident.

E. **Pain, Swelling, etc.**—Are generally considerable.

LOWER END OF THE HUMERUS.—There may be a separation at the epiphysis, or there may be transverse fracture above the condyles. Sometimes the condyles are split asunder, accompanied or not by transverse fracture of the bone above them. Sometimes one condyle (most frequently the external) is broken off. This fracture is produced by falls or blows on the elbow.

In separation at the epiphysis or transverse fracture above the condyles, the symptoms are—

A. **Deformity.**—The bones of the fore-arm are carried backwards along with the lower fragment. The joint is semi-flexed and the hand pronated. The olecranon projects behind, and there is a hollow above it. It is placed higher than it should be, but retains its relationship to the condyles. In front above the bend of the joint there is a hard irregular body (end of the shaft) apparent, raising the brachialis anticus and biceps. The antero-posterior measurement of the elbow is augmented. Reduction of the displaced bones is easy, but displacement is quickly reproduced when the extending force is removed. By careful measurement from the acromion to the inner condyle it will be seen that the humerus is shortened.

B. **Unnatural Mobility.**—Marked, and at a point above the condyles, and this motion is in all directions, not merely antero-posterior, as in the normal movement at the elbow-joint.

C. **Crepitation.**—Decided, on extension so as to bring the fragments into contact. It is best produced by fixing the upper fragment with one hand, and quickly flexing and extending the fore-arm.

D. **Loss of Function.**—Decided.

E. **Pain.**—Great.

The differential diagnosis from dislocation of fore-arm bones backwards, is given at page 194.

When *one condyle* is knocked off, the symptoms are—

A. **Deformity.**—The prominence at the side of the joint is lost, and the detached bone may be felt projecting behind, especially during extension, in the case of the inner condyle. It lies lower than usual. The ulna appears dislocated backwards when it is the inner condyle that is broken off, so prominent does it become during extension of the fore-arm, but in flexion it resumes its normal position. In extension, too, the lower end of the humerus becomes prominent in front of the articulation. If much of the external condyle is broken off, it may draw the radius somewhat backwards with it. In any case the shape of the joint is altered.

B. **Unnatural Mobility.**—The movement of the fragment may be made out.

C. **Crepitation.**—May be observed by flexing and extending the arm when the inner condyle is broken, or by grasping the condyle itself, and moving it, or in the case of the external condyle by rotating the radius.

D. **Loss of Function.**—There is little loss of function, though the motions are usually performed imperfectly.

E. **Pain, Swelling, etc.**—Flexion and extension are painful. Occasionally the ulnar nerve is injured in fracture of the inner condyle, and then the effects of such a lesion will be apparent in the hand. The swelling is seldom great, though the discoloration may be, unless there is effusion within the articulation, and this may be sufficient till it subsides to mask the injury that has been sustained.

When the condyles are split the lower part of the humerus is breadthened. There is unnatural mobility and crepitation between the condyles, and on moving the upper and lower fragment. The humerus is shortened, and the radius and ulna are displaced backwads.

In examining the elbow, in the case of suspected fracture, bend the fore-arm, and grasp the joint in the palm of the left hand, placing a finger on each condyle, and then communicate motion to the joint with the right hand. Such motion should be both in the antero-posterior and lateral direction.

JAW, UPPER.—Direct violence usually, or indirect, through the lower jaw, as when the head is compressed between a force applied to the summit and the base of the lower jaw, or when the chin has been violently struck from below upwards.

This fracture is frequently combined with a wound of the face or the gum.

A. **Deformity.**—If there is displacement, then there will be abnormal hollows and projections.

B. and C. **Unnatural Mobility and Crepitation.**—Easily discovered by direct pressure.

D. **Loss of Function.**—Mastication embarrassed or impossible.

E. **Pain, Swelling, etc.**—Usually great and marked.

JAW, LOWER.—Fracture may occur in the body, ramus, condyle, or coronoid process.

*Body.*—Transverse or oblique, unilateral or bilateral, simple or compound, comminuted or not. Usually by direct violence.

A. **Deformity.**—The regular line of the jaw is interrupted, yet its superficial position enables us to examine the bone with care. The anterior fragment is usually displaced to the inside of the posterior one, or it is drawn downwards below it, and this will be especially manifest in attempts to close the mouth when the fracture lies near the symphysis. The teeth contiguous to the fracture will be on a different level.

If the fracture is in the *ramus*, the displacement and deformity will be very slight.

If in the *condyle*, that process is carried forwards and inwards, and thus an unnatural hollow is found in front of the ear, and a distortion of the lower part of the face results which is striking. The chin is drawn to the side on which the fracture is placed, and not to the opposite side, as it is in dislocation.

In fracture of the *coronoid* process, the fragment is carried upwards by the temporal muscle, and may be felt so displaced if the finger is introduced into the mouth, and a hollow is at the same time observed in the normal position of the process.

B. **Unnatural Mobility.**—The rigidity of the jaw is lost in fracture of the body and condyle, and this is the more marked in the case of the former, the nearer the fracture is to the symphysis. It is especially observable in bilateral fracture. Unnatural mobility is not so evident in fracture of the ramus and coronoid process.

C. **Crepitation.**—Marked (except in fracture of the coronoid process), especially when the symphysis is pushed towards the base of the skull, and the jaw raised and depressed, or when the angle of the jaw is fixed, and firm pressure made while the chin is seized and moved.

D. **Loss of Function.**—Marked.

E. **Pain, Swelling, etc.**—Decided. The pain is increased at the point of fracture by motion. If the dental canal is involved, and the dental nerve injured, there may be loss of sensation in the lower lip. Salivation is common.

ILIUM.—Direct violence.

A. **Deformity.**—Shape, contour changed. Absence of normal projections, and abnormal ones present. Irregularity of outline.

B. and C. **Unnatural Mobility and Crepitation.**—Observed on grasping the fragments, the thigh being bent and the body semi-erect. Rotating the thigh sometimes best develops these signs.

D. **Loss of Function.**—Locomotion difficult or impossible. There may be indications of visceral injury.

E. **Pain, Swelling, and Discoloration.**—Great.

LEG, Fractures of both bones of the.—Direct violence or indirect, as falls on the foot. At the same or different levels. If at the same level, it occurs most frequently at the union of the middle and upper third. Transverse or oblique.

A. **Deformity.**—Displacement in any way. When the displacement is as to length, the upper fragment is generally in front of the lower. Rotation, too, may exist, and frequently angular displacement is found as well. If there is riding of the fragments, there will be shortening of the limb. Irregular projections of bone and unnatural hollows are also observed.

B. and C. **Unnatural Mobility and Crepitation.**—Easily distinguished.

D. **Loss of Function.**—Decided. Spasmodic movements of the limb not uncommon at night.

E. **Pain, Swelling, etc.**—Great. Frequently vesicles or blisters form on the limb at the place of fracture.

As to the lower end of the bone, the fibula is not unfrequently broken about three inches above its lower extremity, and the point of the inner malleolus knocked off at the same time ("Pott's fracture"), the foot is then generally displaced. The seat of the fracture in the bones can be felt, and crepitation produced by communicated movements. The pain, swelling, and discoloration are usually great.

The fibula being broken at the same point as in Pott's fracture, the tibia may give way obliquely upwards and outwards. Then the breadth of the joint is much increased, as if the malleoli were split asunder. The foot is rotated outwards, the toes are everted, and the heel inverted. Crepitation is easily produced, and the point of fracture is defined by palpation.

NOSE, Fracture of.—Always occurs by direct violence. Frequently there is a wound of the integuments, or the pituitary membrane.

A. **Deformity.**—Flattening generally, or displacement to one side. Such displacement may be evident to the hand, when not recognized by the eye, in consequence of the great swelling. There may be obstruction of the lacrymal duct when the lacrymal bone is broken, and emphysema of the forehead may exist.

B. and C. **Unnatural Mobility and Crepitation.**—Are made apparent on seizing and moving the nose.

E. **Pain, Swelling, and Discoloration.**—Great usually.

PATELLA.—Caused by direct violence or muscular contraction. Blows, falls on the knee, when it is much bent and the muscles in action. It may be transverse, vertical, or oblique. It is usually easily recognized.

A. **Deformity.**—The round, prominent, even shape of the knee is changed. There may be a transverse or vertical hollow, which, though it may be slight in vertical fracture, is in transverse fracture, when the fibrous expansion covering the bone is fairly torn, wide enough to allow the finger to pass into it as far as the skin can be depressed. Occasionally, on the other hand, there is a projection between the fragments resulting from the effusion within the joint bulging the capsule out between the fragments. The hollow above referred to is increased on flexion, and diminished on extension. In transverse fracture the upper fragment is drawn upwards in front of the lower part of the thigh, especially during flexion, and during extension it can be pushed down again.

B. **Unnatural Mobility.**—In transverse fracture the knee is looser than it should be when passive movements are communicated to it. In vertical fracture, again, the abnormal motion in the bone may be rendered apparent by alternate pressure on the outer and inner side of the bone.

C. **Crepitation.**—If the fragments are in contact, this is apparent; hence it is more evident in vertical than in transverse fracture. A false feeling of crepitation has sometimes been observed when blood was effused between the integument and the bone.

D. **Loss of Function.**—Progression difficult. The limb has to be kept fixed at the knee when the patient walks. Extension is lost.

E. **Pain, Swelling, etc.**—All frequently well marked.

This fracture may be confounded with rupture of the great extensor tendon or the patellar ligament; but in these cases the patella is felt entire, its outline is complete, and the hollow observed is not in the continuity of the bone, but above or below it.

RADIUS (*see Fore-arm bones also*).—This bone may be broken in its upper end, in its shaft, or its lower end.

*Upper end*—Always by direct violence. If the fracture be above the tuberosity, there will be no displacement; but if it be situated below that process, then the biceps draws the tuberosity up, so as to make it felt under the skin, and this projection will be rendered more evident on extending the fore-arm. By fixing the external condyle and rotating the radius crepitation may be produced. Flexion is difficult or incomplete, and the hand is generally pronated. As the violence causing this fracture is usually great, the swelling, pain, and discoloration will be very apparent.

*Fracture of the shaft.*—Is generally easy of detection. There is irregularity in the bone caused by the displacement of the fragments towards the centre line. The hand is pronated. Unnatural mobility and crepitation are evident on alternately pressing on the fragments above and below the place of fracture, and rotating the bone. There is loss of power, and supination cannot be effected. There is pain at the point of fracture. Swelling and discoloration, too, are usual.

*Lower end.*—"Colles' fracture." Generally caused by direct violence, but may be by indirect, as in falls on the thenar side of the palm of the hand, and more rarely by falls on the back of the hand. It is most generally met with in old women. It may be transverse or oblique, and is situated about an inch above the lower end of the extremity of the bone. There is frequently impaction, the compact upper fragment being driven into the spongy lower one, which is occasionally split into fragments. The displacement which is most common is that of the lower fragment backwards and slightly upwards, with a certain degree of rotation on its transverse axis.

A. **Deformity.**—The hand is bent towards the radial side. The radial border of the fore-arm is concave, and the ulnar convex. The styloid process of the ulna is very prominent. When held up and looked at from the radial side the deformity assumes a peculiar shape, which has been likened to the letter Z, with very open angles. Velpeau likens the posterior surface of the wrist to the back of a table-fork. This deformity is caused by the projection backwards of the carpus and styloid process, and the displacement forwards of the lower end of the upper fragments of the radius, and there being a hollow above the one and below the other. In the normal condition the back of the hand is on the same plane as the fore-arm, but after this fracture it is carried backwards and presents a short oblique plane, rising at the joint, and joined to two other planes, those of the hand and the fore-arm. This disposition is not always equally marked, but by fixing the fore-arm and carrying the hand backwards it can be made very apparent. The projection on the front of the wrist is much less prominent than that upon the dorsal surface, but it reaches up the fore-arm a considerable way, and is situated at a higher level than the other projection. It passes across the whole wrist, but is more marked upon the radial side, disappearing as it nears the ulnar. The tendons are tensely strung over the ends of these projections. The antero-posterior diameter of the joint is augmented. The wrist is no longer flat but round. The patient carries the injured limb in a position between pronation and supination, in the palm of the other hand, lying on its ulnar side, and he inclines his whole body somewhat to the side of the injured limb. By careful measurement the radius will be found shortened and the ulna of its normal length, while the styloid processes retain their relationship to the carpus. The styloid process of the radius lies higher up and is in front of that of the ulna.

B. and C. **Unnatural Mobility and Crepitation.**—If complete impaction has taken place then this sign will not be apparent, but in ordinary cases it can be developed by fixing the fore-arm, grasping the hand and carrying it well to the ulnar side, and then moving it laterally and rotating it; or by bending the hand smartly backwards and forwards.

D. **Loss of Function.**—The function of the hand is lost, or nearly so. Supination and pronation are impossible, unless the fragments are firmly impacted, when these movements may be communicated to the joint. When the patient attempts to supinate the fore-arm, he turns the whole extremity from the shoulder. The radius cannot be rotated.

E. **Pain, Swelling, and Discoloration.**—Pain is great at the inner side of the joint, and especially on the radial side and below the styloid process of the ulna. It is increased on attempts at supination. Swelling of the wrist and antero-posterior enlargement of its diameter on the radial side exist. Discoloration is seldom marked.

This fracture can only by culpable carelessness be mistaken for a sprain or for inflammation of the articulation. In neither of these affections is there the peculiar deformity, unnatural mobility, or the crepitation above described. As to the distinction from dislocation, see page 203.

In those rare cases in which the displacement of the fragments is the opposite of that above described, then the deformity will be in some measure reversed, the projection like the back of a fork being in front in place of behind, &c.

RIBS.—Fracture of these bones may occur by direct or indirect violence or muscular contraction. Direct violence effaces, and indirect violence augments, the natural curves of the bones, and cause the ribs to give way at or about their centre. In the former case the fragments are projected inwards; in the latter they are displaced outwards. The fourth, fifth, sixth, and seventh ribs are those most liable to fracture, and that in their anterior or posterior thirds. One or more bones may be broken. The fracture may be complete or incomplete (rare), transverse or oblique. If the fragments are driven inwards, there is likely to be the complication of injury to internal organs.

A. **Deformity.**—There is seldom much displacement. If there is any, then we will find inequality on tracing the rib. If several are broken, their irregularity may be very apparent. The whole side may be depressed, or parts may project irregularly. There may also be emphysema, hæmoptysis, or other indication of injury to the pleura or lung.

B. and C. **Unnatural Mobility and Crepitation.**—These are difficult to recognize. They are best discovered by pressing alternately with two fingers along each rib, or, when the back is supported, pressing on the sternum with one hand while the other is placed flat over the suspected part; or making the patient cough or breathe freely while several fingers collected together are pressed over the injured part; or by laying the hand flat on the place where the fracture is supposed to exist while the other hand makes counter pressure on the opposite side of the chest. The stethoscope is here of much use, especially if an assistant makes pressure on the fragments while the surgeon's attention is directed to catch the crepitation. Sometimes the patient distinctly perceives the crepitation when he makes a deep inspiration.

**D. Loss of Function.**—The respiration is embarrassed, and the movements of the chest are limited. The breathing is shallow and restricted.

**E. Pain, etc.**—The pain is fixed at a spot, and increased on respiration and cough. This is a very important sign in obscure cases. It is much more circumscribed and fixed in the case of a fracture than when we have to deal with mere contusion. The swelling, unless from emphysema, is seldom great. The discoloration may be evident if the fracture has been produced by direct violence.

Add to the above signs those which are due to the injury of organs contained within the chest, lesion of the intercostal artery, the pleura, lung, heart, &c., as occasionally seen in fracture of the ribs.

If only one rib is fractured, and it be at a part where there is a thick covering of muscle or fat, we may have only fixed pain and somewhat restricted respiration to guide us in judging of the nature and seat of the injury.

SCAPULA.—The body of this bone may be fractured by direct violence. Its processes may be broken by direct or indirect violence.

*Body.*—This may be broken in any direction.

**A. Deformity.**—There is usually very little displacement, from the manner in which the fragments are clasped and held together by the muscles covering the bone; hence there may perhaps be no deformity observed, even when the fracture is extensive. The whole of the bone may be palpated, and occasionally one of the fragments may be felt to overlap the other. If the spine is broken, there will probably be irregularity observed in that portion of the bone. By placing the fore-arm in front of the chest, and then behind the back, the bone may be traced throughout its whole extent with greater facility.

**B. and C. Unnatural Mobility and Crepitation.**—These are apparent by fixing the shoulder and seizing the lower angle of the scapula, when the elbow is carried backwards and the fore-arm flexed, or by direct alternate pressure on the different parts of the bone, or by applying the palm of the hand over the scapula, and moving the arm freely in different directions.

D. **Loss of Function.**—Voluntary motions of the arm are restricted or painful, and this is in a great measure due to the accompanying contusion.

E. **Pain, etc.**, is great usually, and increased by pressure, coughing, and all movements of the arm. The swelling and discoloration, also, are usually evident as the injury is generally severe.

Sometimes in fracture of the body of the scapula we have only negative signs to guide us in recognizing it. After a fall or a blow sufficient to fracture the bone, we observe crepitation; but its exact seat cannot be determined. We examine the clavicle and acromion and coracoid process, and find no fracture. We see that the fore-arm can be bent, and the humerus, when drawn from its articulation, can be rotated without difficulty or pain. In such a case, we may conclude that the scapula has been broken somewhere in its body.

*Inferior angle.*—The displacement here is forwards, or forwards and downwards, according to the place of fracture and the muscular fibres which remain attached to the fragments. The displaced fragment may be felt as displaced, and a hollow exists at the part from which it has been removed.

B. and C. **Unnatural Mobility and Crepitation.**—By hooking the fingers under the fragment, and so moving it, or while the arm is moved backwards and forwards with one hand, and the other is placed flat over the bone, these signs may be developed.

D. **Loss of Function.**—The function of the serratus, great dorsal, and great teres muscles are embarrassed, according to the amount of bone broken off.

E. **Pain, Swelling, and Discoloration.**—Are generally considerable.

NECK OF SCAPULA, along with the coracoid process, is a very rare fracture.

A. **Deformity.**—Displacement is downwards, along with the head of the humerus, and it can be obscurely felt in its new position. The roundness of the shoulder is gone. The acromion projects. There is a hollow below that process where the head of the humerus should be; but this hollow is not so decided as in dislocation of the head of the humerus into the axilla. The coracoid process moves with the humerus, and no longer with the scapula. The arm is lengthened.

B. and C. **Unnatural Mobility and Crepitation.**—Are easily produced. When the elbow is raised (the fore-arm being bent) and pushed upwards, the roundness of the shoulder is restored; and if the hand is placed over it, having a finger on the coracoid process, and the palm on the shoulder itself, and then the arm rotated, crepitation is observed. So soon as the arm is no longer supported, the displacement recurs.

D. **Loss of Function.**—The arm is powerless.

E. **The Pain** is frequently great, from pressure on the nerves. Swelling of the shoulder and hand, and discoloration, are generally found.

This injury is distinguished from fracture of the neck of the humerus, by the head of the bone remaining in its socket, and hence there being no void there, and there being no such prominence of the acromion as is observed when the scapula is broken at its neck. The coracoid process, too, remains *in situ* in fracture of the neck of the humerus, and the arm is shortened and not lengthened.

SPINE.—The vertebræ may be broken in their bodies or processes, and that by direct or indirect violence. Fracture may arise from falls on the head, feet, or perineum. It is, however, by causing violent flexion forwards or backwards that the fracture is produced in these accidents. Fracture of a *transverse process* can only be produced by concentrated direct violence, as in gun-shot wounds, and cannot be recognized by itself.

*The spinous processes* are most liable to fracture, and that especially in those parts of the spinal column in which they are most prominent. It usually arises from direct violence.

A. **Deformity.**—There is irregularity at the part. There is absence of the usual projection of the process, and this is most evident when the body is bent forwards. The process is displaced to the side or downwards. In many cases there is no displacement, however, at all.

B. **Unnatural Mobility.**—The process is unnaturally mobile, and when no displacement exists, this sign, together with crepitation, is our chief guide in recognizing the injury.

C. **Crepitation.**—Is apparent if the process can be moved.

D. **Loss of Function.**—If the cord is injured there will be paralysis.

E. **The Pain** is great, especially on movement. The swelling and discoloration also are usually marked.

ARCHES AND BODY.—This usually arises from direct concentrated violence, or indirect violence, as in falls on the head or feet, when the spine is violently flexed. It is an injury which is generally rapidly fatal.

A. **Deformity.**—There is depression and irregularity at the part where the fracture is seated, as the fragments are driven downwards and inwards, or downwards and forwards. The body may be bent, and the spinous process of the vertebra next that broken, or fragments of the broken vertebra may project, so as to be prominent in the back. Occasionally the displaced bone may be perceived in the pharynx.

B. and C. **Unnatural Mobility and Crepitation.**—Might be rendered apparent, but it is very undesirable to attempt it.

D. **Function.**—There is always injury of the spinal cord, and the symptoms of such injury will be evident, and form a leading feature in the case. According to the position of the fracture in the column, we may have the paralysis confined to the lower extremity, or extend to the viscera of the pelvis, abdomen, chest, and to the upper extremities. There may be paralysis of motion or sensation, or both. The nutrition, calorification, and circulation may suffer, and various affections of internal organs, thereby produced, may be present.

E. **Pain.**—There is severe pain in the part, especially on motion and pressure. Swelling and discoloration also are common.

STERNUM.—Fracture of this bone usually results from direct violence. It very rarely arises from indirect violence, but it has been seen after falls, in which the back has been struck against a bar, and yet more rarely after falls on the head, nates, and feet. The fracture, in such cases, occurs by counter stroke, or by muscular contraction. In, at least, two instances the sternum was apparently fractured by muscular action during parturition.

The fracture may be transverse or oblique, and very rarely it has been observed to be longitudinal. It may be simple or compound. If there is displacement it is antero-posterior; the lower fragment being usually in front, though occasionally it may pass backwards.

A. **Deformity.**—There are projections and hollows if the fragments are displaced. The bone is irregular. There may be emphysema. It is necessary in examining these cases to be on our guard against the existence of congenital irregularity in the bone.

B. and C. **Unnatural Mobility and Crepitation.**—These are recognized by alternately pressing on the fragments. Sometimes they are recognized during respiration, and by the stethoscope when forced breathing or cough is excited.

D. **Loss of Function.**—The movements of the chest are embarrassed.

E. **The Pain** is great, and concentrated at the place of fracture.

To these symptoms we must add such as may be caused by injury to the chest, if such co-exist, or to blood effused into the anterior mediastinum, and afterwards, perhaps, those symptoms which are due to abscess occurring in the mediastinum, and to disease of the bone.

TIBIA (*see Leg also*).—This bone may be broken by direct or indirect violence. Either its upper or lower epiphysis may be separated, or the bone may be broken at any part of its length. The fracture may be transverse or oblique, or in V, in which the upper fragment is driven into and usually splits the lower. In rare cases the bone is broken longitudinally, and no sign during life, except a certain loss of function and pain, may mark its occurrence.

The displacement in fractures of the tibia may be slight, and thus the signs very obscure; but the irregularity of outline in most cases (if there be no more decided displacement), the unnatural motion at the part broken, the crepitation, the loss of function, the fixed pain, and frequently the formation of blisters over the part, will point out the seat of fracture. Occasionally, when the tibia alone is broken, and the fragments have not been displaced, there may be no sign of the lesion at first, except fixed pain and the existence of blisters. The patient may even use the limb for some time, and be little conscious of the injury he has sustained.

The internal malleolus is sometimes broken without there being any other fracture near the joint.

ULNA.—May be broken in its shaft or its processes.

*Shaft and lower end.*—Usually by direct blows, and more rarely from falls on the ulnar side of the hand.

A. **Deformity.**—There is irregularity of the bone. There is projection of the lower end of the upper fragment, and a depression below, as the lower fragment is carried towards the radius. There is not always, however, any displacement. The hand is supinated.

B. **Unnatural Mobility.**—This sign is developed by pressing alternately on the two fragments with the thumbs, as we grasp the arm with both hands, and hold it across our body; or by grasping the upper fragment, and pressing the lower towards the radius.

C. **Crepitation.**—Apparent on applying the above manœuvre.

D. **Loss of Function.**—There is little power in the arm.

E. **Pain, etc.**—Usually considerable.

OLECRANON.—This fracture is produced by falls or a blow on the elbow when the arm is bent. It is in rare cases produced by the violent action of the triceps. It is in men of middle age that it is usually met with. There may be a greater or less amount of the process detached.

**A. Deformity.**—If the fibrous expansion of the triceps is not torn through, then the displacement may be very slight, but if that expansion be fairly divided, the displacement may be to the extent of an inch and a half. The arm is semi-flexed. The point of the elbow is gone. There is a hollow where normally there is a projection. The detached fragment can be felt at the lower and posterior part of the arm, separating and approximating itself to the joint, according to whether the arm is flexed or extended.

**B. Unnatural Mobility.**—The fragment is quite movable, especially upwards and downwards.

**C. Crepitation.**—Is evident on extending the arm, and moving the fragment laterally.

**D. Loss of Function.**—The arm cannot be extended.

**E. Pain, etc.**—This is considerable, if the blow has been severe. There is frequently much effusion into the articulation.

Fracture of the olecranon is distinguished from rupture of the tendon of the triceps, which has many features of resemblance to it—a void at the lower and back part of the arm, increased on flexion, and diminished on extension of the forearm; loss of the power of extension, &c.—and may be caused by a like accident; but in the case of rupture, the lump felt at the back of the arm has not the consistence of bone, nor the shape of the process. The olecranon can be felt adhering to the ulna, and retaining its relationship to the other processes at the elbow-joint; when the fore-arm is extended, no crepitation can be produced; communicated movements are not painful; and there is less swelling and subsequent inflammation than when the bone is fractured.

CORONOID PROCESS OF THE ULNA.—This is produced by indirect violence, as in falls on the palm, especially on the ulnar side. Direct blows or muscular contractions of the brachialis anticus may also cause it. It is very rare without dislocation of the fore-arm backwards. If the whole process is broken off at its base, then there will probably be complete or incomplete dislocation of the fore-arm bones backwards; or the ulna alone may be so displaced, and the injury to the articulation will be great. If the tip only is separated, and the ulna is displaced, it can be easily restored, and crepitation will then be developed; but the displacement easily recurs when the extension is removed.

If there is no dislocation of any of the fore-arm bones, then the deformity may be very slight. There may be only some fulness in front of the articulation, where a small, hard, movable body can be felt.

Crepitation cannot be relied on; and as to the loss of function, the inability completely to flex the fore-arm may arise from dislocation of the head of the radius forwards, and should be carefully distinguished.

**GANGLION.**—A "cystic transformation of the cells inclosed in the fringe-like processes of the synovial membrane of the sheaths of tendons." A circumscribed tumour, which forms in the course of and in connection with the sheaths of the tendons. Generally round in shape, but occasionally fusiform, oval, or irregular. Sometimes hour-glass shaped. In size varying from a small nut to a hen's egg. The contents are more or less fluid. Occasionally they are semi-solid. Sometimes the tumour becomes elongated when the tendon is put on the stretch. Frequently these tumours contain many melon-seed-like bodies composed of lymph. Ganglia are said to be more common in females than males.

The more usual position for these swellings is the back or front of the wrist, the dorsum of the hand, the instep, the malleoli, the knee, the external head of the gastrocnemius, more rarely the tendon of the trochlearis, and the back and front of the fingers.

The tumour is smooth, firm (sometimes hard as a chestnut), elastic; movable, especially laterally, when the tendon is relaxed; having the skin over it rarely affected unless it has been of long standing and exposed to friction. A ganglion is unreducible, indolent, slow of increase. It may remain long stationary. It may appear suddenly, and go off as suddenly by rupture or absorption, and may reappear or not again. Sometimes a ganglion is fluctuant, but it is rarely prominent enough to enable us to test its transparency.

On pressure being applied to a ganglion, a peculiar crepitation is observed, as if granules of starch were being rubbed together. This sensation is quite characteristic, and is due to the attrition of the melon-shaped bodies before alluded to. There is a certain weakness and embarrassment of function in the muscle whose tendon is the seat of ganglion.

When a ganglion is seated near a joint, it may be mistaken for a much rarer affection, viz. hernia of the synovial membrane through the ligaments ("synoviparous crypts"). When such a pouch is filled with fluid, it forms a tumour very like a ganglion; but during such movements as relax the ligaments through which the protrusion has passed, the tumour is diminished; and steady pressure applied while such a relaxed condition of the ligaments is maintained, will diminish, if not entirely remove, the swelling. Ganglion, on the other hand, undergoes no such change by like manœuvres. The crepitation observed in a ganglion, and its being placed where such a hernia as that above referred to cannot exist, will further distinguish them. In such rare cases as when the hernia of a synovial membrane gets shut off from all connection with the articulation, crepitation may be the only sign by which we are able to judge of its true character.

Diffused ganglion occurs at the wrist joint, and extends into the palm of the hand and up the fore-arm. It is also met with on the sole and along the inner side of the dorsal surface of the foot. When it occurs in the hand, the fluid can, by alternate pressure above the joint and in the palm, be made to pass under the annular ligament from the one pouch to the other. The hand is semi-flexed; there is a certain loss of power, and considerable uneasiness usually, especially in the morning.

The size, position, shape, and greater firmness of the tumour, together with the history of the affection, and an observance of the constitution of the patient, will distinguish ganglion from chronic or cold abscess.

Solid tumours have been confounded with ganglia; but their being harder, firmer, less movable (and what degree of mobility they possess being equally great in all directions), their increasing generally more rapidly, and embarrassing the parts more, will indicate their character. A ganglion forming near an artery like the radial, and receiving an impulse from it, has been taken for an aneurism and also for an erectile tumour; but a ganglion is not diminished by pressure; the pulsation is a heave, and not an excentric throb; and, lastly, the position of the part does not affect its size nor the vigour of its movements.

**GLANDERS AND FARCY.** EQUINIA.—A virulent specific affection, transmitted from the horse to man by inoculation or infection. It may be acute or chronic, and is very fatal. It may be said generally that, when it is communicated by inoculation, the local symptoms are first seen; and when received by infection, the constitutional symptoms take the lead. It is only when it is derived from inoculation, and so remains for a time local, and when it is seen early, that there is any hope of arresting it.

*Local signs* of the acute disease.—A wound inoculated with the poison may cicatrize healthily, and yet the affection appear afterwards in the system; but this is unusual. Generally the wound gets irritable, hot, and painful. The part swells, and the lymphatic vessels and glands inflame, and commonly quickly suppurate. The veins, too, generally participate in the inflammation, and erysipelas of a simple or phlegmonous type appears on some part of the body. Multiple abscesses form in the cellular tissue either superficially or deeply, and after bursting, remain fistulous, or become the seat of unhealthy ulceration. Violent pains of an aneurismal character occur in the limbs and joints, especially at the flexure of the groin, in the neck, and axilla, and are augmented in intensity at night. Low typhoid fever, accompanied by great prostration, and the appearance over the body of a pustular eruption closely resembling smallpox, complete the symptoms of *farcy*. When the disease goes on to ulceration and discharge from the nasal cavities, it is then *glanders*. The latter complaint very seldom occurs without the former, but we may have the former without the latter. In farcy, the inflammation of the lymphatic vessels and glands is the leading sign; in glanders, the ulceration of the Schneiderian mucous membrane, accompanied by such lymphatitis, is the distinctive characteristic.

Tumours consisting of tubercular matter form in the tissues, glands, and cavities. These are hard or soft, painless or very sensitive, in different cases. Pus is occasionally effused into the articulations. The eruption which occurs on the skin and mucous membrane of the mouth and nose is frequently followed by gangrenous ulceration, by which the most frightful deformities are occasioned. The mucous membrane swells, inflames, and ulcerates, and a profuse, thin, watery, fœtid, sanious, and contagious discharge is poured out. The face and nose swell, there is pain in the frontal sinuses, the parotid and submaxillary glands and tonsils enlarge, suppurate, and burst. The eyes are closed; bullæ, filled with bloody serum, form on the face and round the larger joints, and when they burst, reveal a gangrenous spot on the skin. The affection of the nose may appear so early as to be the first local sign of the disease.

*Constitutional symptoms.*—The disease first sets in with the usual signs of pyrexia. The fever, at first inflammatory, soon assumes the irritative or typhoid type, accompanied by great prostration. As the eruption invades the windpipe, œdema glottidis may embarrass the breathing to a fatal degree. Low pneumonia, resulting in the formation of disseminated abscesses, may arise; diarrhœa or dysentery increase the prostration; delirium follows, and death takes place from sinking or coma.

In distinguishing this affection, when acute, from others, there can be no difficulty as regards glanders, as the group of symptoms which constitute it are altogether peculiar and characteristic. The discharge from the nostrils, being inoculable, might in any doubtful case aid us in elucidating the nature of the disease; and the account of its origin will always be an important element in our diagnosis.

To mistake the articular pains for *acute rheumatism* could only occur in very slight cases of farcy, and at an early stage of the disease, before the lymphatic inflammation has become developed. Besides, the articular pains in farcy are not accompanied by swelling, heat, and redness in the joints, as they are in acute rheumatism.

It would almost seem needless to point out the distinction between glanders and *dissection wounds*, were it not that they have actually been confounded; but the history of the malady, the nasal discharge, the eruption, the knots in the muscles, and, in fact, the whole group of symptoms, ought clearly to differentiate them.

The chronic form of glanders has been taken for *syphilitic ozæna.* Here there may be nocturnal pains, lymphatic engorgement, skin eruption, multiple tumours, profuse nasal discharge, ulceration of the nose, mouth, and throat, &c. It is by the history of the case; the occupation of the patient, and the opportunities of contact with diseased horses; the pre-existence or not of primary syphilis; the co-existence of other signs of that disease; the character of the eruption; the implication of the mucous membrane, of the nose only in the first instance in glanders, or of the bones as an early symptom in syphilis; and lastly, the effects of treatment. Besides these points of distinction, it may be added that the character of the syphilitic ulcer is peculiar, and it begins without the previous abscess or bullæ of glanders; that the pains in syphilis are more along the bones than in the joints, and are usually associated with nodes and exostosis, and that the tumours which occur in the soft parts when opened contain fluid of a very different character from that inclosed in the glanderous abscess.

The *grease from the heels of horses* produces at times on the hands of grooms a pustular eruption ("Equinia Mitis") which, by carelessness, might be mistaken for farcy, but it is purely a local affection, and a mild one—the pustules mature about the third day, and scab from the twelfth to the fourteenth.

In *scrofula* we may have ulceration of the nose and throat, lymphatic engorgement, abscesses, ulceration, necrosis or caries, in a combination that may, with a certain history, cause a confusion between it and chronic glanders; but the succession of the phenomena is quite different in the two diseases, being slower in scrofula, and only (in the form in which any confusion can arise) occurs in the young, who, at the same time, bear in other ways especial indications of the strumous diathesis. The affection of the lymphatic glands and bones is primary in scrofula, and the glands affected are usually the superficial ones of the neck and axilla; the abscesses form slowly, and are very indolent; while in glanders the lymphatic and bone affections are secondary; and the abscesses are numerous, occur mostly on the lower extremities, and come rapidly to the surface and burst.

**GROIN.**—May be the seat of many different tumours. Some of these grow in the part itself, while others come to it as it were accidentally from the abdomen.

In the part itself the meshes of the cellular tissue; the fat; the absorbent glands; the blood-vessels; the bones and the spermatic cord may give rise to various growths, which may either present themselves in a distinct form, or may be variously and very confusedly combined.

The various tumours which may be met with in the groin are:—1. Enlarged lymphatic glands; 2. Abscesses; 3. Lipomata; 4. Aneurism; 5. Varicose dilatation of the Saphena; 6. The dislocated or fractured head of the Femur; 7. Hydrocele and Hematocele of the cord; 8. Hernia; 9. Testicle arrested at the ring; 10. Cancerous tumours; 11. Cysts; 12. Enlargement of the bursal sac which lies below the tendon of the iliacus and psoas; 13. Fibrous tumours of the iliac fossa. It will be necessary to consider each of these.

1. Enlarged lymphatic glands.—These may be simple (as arising from irritation), scrofulous, or venereal. If solitary, hard, and painless, and if lying above Poupart's ligament, then they are probably syphilitic. If multiple and lying chiefly below Poupart's ligament; if they attain a considerable size without pain; if they suppurate slowly and are accompanied by a considerable degree of brawny engorgement, and especially if they occur in both groins, and similar swellings are found in other parts, and if the habit of body be strumous, then they are scrofulous. Lastly, if there are several glands affected; if they are painful, and they lie above and below Poupart's ligament, then the penis, scrotum, perineum, abdominal wall and lower extremity (especially the toes) should be searched for excoriation or other sources of irritation.

2. Abscesses in this region may come from many sources. See p. 61 for the general characters of abscess. (*a*) Local, depending on inflammation of the cellular tissue, in which

case there will be signs of inflammation and phlegmon before the appearance of the fluctuating tumour.

(*b*) Psoas abscess coming from the lower dorsal and upper lumbar vertebræ. In this case the pus points *below* Poupart's ligament, between the psoas and iliacus muscles and the inferior spine of the ilium, and nearer that process than a herniary tumour. There will be dorsal pain, and probably deformity of the back; lameness; the body is bent forwards and somewhat to the side, and there is inability to stand erect or stretch the limb. It occurs in children mostly, and often appears suddenly. It is very fluctuant and elastic. It has an impulse on coughing, which is more direct in its character than that observed in hernia. It is tolerably circumscribed, and can be partly or wholly reduced when the patient is placed in the recumbent position and the pelvis raised. It then returns slowly and without a gurgle, and reappears again on the pressure being removed, even without the patient resuming the erect posture or making any effort.

(*c*) Abscess connected with disease of the hip occasionally presents itself here, when we will have the history of the case and the evident implication of the joint antecedently and contemporaneously to guide us.

(*d*) Abscess forming in the psoas muscle itself is a very rare event unconnected with disease of the spine, yet it is occasionally observed. The signs by which it is recognized are, embarrassment in the function of the muscle; inability to stand erect or walk without lameness; the absence of all indications of disease in the spine, and in bad cases and advanced stages of the disease, the thigh being bent on the abdomen, and the toes turned in, so as to diminish pain by relaxing the muscle.

(*e*) Abscess descending from the kidney and connected with inflammation of the cellular tissue around that organ. Here the previous and probably present indications of irritation of the kidney, and the absence of any symptom by which it can be connected with any other part, will point out its source.

(*f*) Iliac Abscess.—This is described at length at a subsequent part of this work.

(*g*) Empyema in very rare cases, having perforated the pleura and dissected its way down behind the diaphragm, may appear in the groin. Here the chest symptoms and the information obtained by the use of the stethoscope will enable us to recognize the true nature of the malady.

(*h*) Abscess from the cellular tissue around the cæcum. In this case the previous intestinal irritation, the pain over the cæcum, and the very offensive nature of the pus which escapes when it has been opened, will point out the place from which it comes. This form of abscess can of course only occur on the right side.

3. Lipomata are very rare in this region, but if they occur they will be recognized by their slow painless growth; their soft, inelastic, doughy feeling; their round or oval shape; their being circumscribed, and pedunculated or diffused, by the absence of all indications of other disease, and it may be by their having descended slowly into the groin from the abdominal walls. There is no impulse on coughing in such a fatty tumour, and it is unaffected by pressure. Occasionally a small fatty tumour is found in the crural canal, which may closely simulate a femoral hernia.

4. Aneurism (see p. 71). Diffuse aneurism of the abdominal aorta, or iliac artery, may present an indolent nonpulsating tumour in the groin, having come down the sheath of the psoas; but the history of the symptoms, the sudden appearance of the tumour, the evidence derived from stethoscopic examination, and there being no distinct fluctuation, as in psoas abscess (with which it is most apt to be confounded), will lead us to recognize its character. If there is pulsation in a psoas abscess it will only be along the course of the artery lying below it, and not throughout the tumour.

5. Varicose dilatation of the saphena at the crural opening. This is a soft, fluctuating, knotty tumour, perhaps of a blue colour, reducible, and having small points of dilated blue vessels in the skin around it, and possibly also being accompanied by a varicose condition of the veins of the thigh and leg. This tumour enlarges under the action of moist heat, and if, when it has been effaced by pressure, we apply the hand over the femoral vein, above the external ring, the swelling will quickly reappear when the patient stands up.

6. Dislocated head of the femur; projection in the groin of the upper end of the lower fragment, in fracture of the femur below the lesser trochanter; fragments of broken pelvis; exostosis, &c.; these may occasion tumours in the groin, but their nature will be easily distinguished, and cannot be mistaken.

7. Hydrocele of the cord. (*a*) If encysted, then the tumour will be tense, elastic, and firm, and of an oval shape. It is well circumscribed, and lies in the axis of the cord, either in the inguinal canal, or just below the external ring. It grows very slowly; is painless on pressure; has no impulse (or at least no expansive impulse) on coughing; is movable; may be pushed up the canal, and may seem even to pass into the abdomen, but without any gurgle, and returns again on the pressure being removed, when the patient coughs or strains, and then assumes the same size and shape as it presented before reduction. It may, if prominent, be transparent, and is distinct from the testicle; and if combined with undescended testicle, it will lie behind the gland. This tumour is mostly seen in infants, and may be too tense to fluctuate. If the characters above described are not sufficient to distinguish the nature of the affection, an exploring needle may be employed.

(*b*) Diffused hydrocele of the cord is broad-shaped when the patient is recumbent, and cylindroid or pyramidal (the base being below) when the patient is erect. It has no impulse, or at best a very obscure one, on coughing. It is separated by a space from the testicle. The cord cannot be felt. It cannot be wholly reduced, and when pressed up into the canal it goes up as a soft inert mass, which soon returns. Its surface is uniform, and the swelling forms slowly, and without pain or uneasiness, except such as arises from its mechanical effects. If the collection is large, fluctuation will be obtained at its lower part.

(*c*) Hematocele of the cord. This is a rare affection. It forms a soft tumour, usually beginning in the inguinal canal and passing downwards. If small it is hard, and if large it is indistinctly fluctuant. It is incompletely reducible; imparts no impulse on coughing or gurgle when it is returned into the canal. Being usually caused by violence it appears suddenly, and is frequently accompanied by ecchymosis of the part. The testicle is free below it, and the cord, too, is unimplicated usually at its inferior end.

8. Hernia (which see). It may be here remarked, however, that a hernia, after reduction, returns with a "thud," and more rapidly than an abscess. It descends much more easily when the patient is in the erect than in the recumbent posture. After reduction it does not reappear so long as the patient retains the horizontal position, unless on violent effort. When the patient makes a violent cough the protrusion becomes evident to the eye, as it descends in one or several pieces. The history, too, connected with it, and the fact that it often varies in size, according to the repose taken or exertion made by the patient, will throw light on its nature.

9. Testicle arrested at the ring. The size and shape of the gland; its lying in the axis of the canal; its absence from the scrotum; the peculiar sickening pain produced when it is pressed; there being no expansive impulse on coughing, and there being no gurgle when it passes up the canal, if it is reducible, will distinguish this swelling. The testicle in these cases is sometimes fixed, and sometimes movable. If the testicle becomes inflamed in its abnormal position it may closely simulate strangulated hernia, but the absence of the gland from the scrotum; the history of the case; there being no continuous or violent signs of intestinal irritation or constipation; the peculiar and violent pain in the tumour; the absence of impulse on coughing, and the consistence of the swelling (its being hard and solid below, and elastic above) will distinguish them.

10. Cancerous tumours are very rare in the groin as primary affections, but they may follow malignant disease of the penis, scrotum, &c. A cancerous tumour may, however, come down through the ring from the abdomen. The history of the case; the hard, irregular, stony nature of the tumour; or its being a soft, rapidly growing, bossy swelling; the implication of the lumbar glands; the cachexia; the evidence of the disease in other parts—by these signs we will recognize this growth.

11. Cysts.—These are not common. They grow slowly; are painless, fluctuant, and occasionally transparent, if superficial;

but fluctuation and transparency will not exist, if they are deep, small, dense walled, and have thick contents. It is by observing their manner of growth, their shape and mobility, and the absence of all indications of other disease, and it may be by the use of the exploring needle, that these cysts are recognized. If placed over the femoral artery such tumours may obtain an impulse; but it is not excentric; there is no bruit; and if the cyst is raised up clear of the artery, the impulse ceases.

12. Enlargement of the bursal sac, which lies below the tendon of the iliacus and psoas, and between it and the capsule of the hip-joint. This sac has generally a communication with the articulation, and then it may be made to enlarge and diminish as the joint is moved. It is fluctuant, deep, and painless. If it enlarge so as to reach the surface it may possibly be translucent. By these characters, and a regard to its position and shape, we ascertain the nature of the tumour.

13. Fibrous tumours occur rarely in the iliac fossa of young married women, and present themselves close above Poupart's ligament, being attached near the anterior superior spinous process. Such a tumour is always solitary, grows slowly, and is firm, smooth, and elastic. The skin over it is unchanged. It is years commonly of reaching any size, and is not accompanied by any intestinal derangement. By its pressure it causes pain, not only in the part where it has its seat, but also in the corresponding extremity. It is slightly movable upwards and backwards, but not so either downwards or inwards. The history and consistence of this growth, its site and fixture, distinguish it from all others.

Of the above tumours some are reducible more or less completely, others are not. This fact forms one broad line of distinction between them.

*Reducible.*—(*a*) Completely: Hernia (one form); abscess from the abdominal cavity, connected with disease of the pelvis, vertebræ, kidney, or pleura; varicose dilatation of the saphena. (*b*) Incompletely: Hydrocele of the cord (encysted and diffused), and hematocele of the cord; diffuse aneurism from the abdomen; undescended testicle (occasionally).

*Irreducible.*—Hernia (one form); enlarged lymphatic glands; local abscesses; lipomata; aneurism of the femoral or external iliac; bony and fibrous tumours; hydrocele of the cord (sometimes); undescended testicle (at times); cancerous tumours; cysts; bursal enlargements.

**GUNSHOT WOUNDS**, Apertures of.—The distinction between the wounds of entrance and exit is not always attainable, even in favourable circumstances. It is before inflammation, with its swelling and effusion, sets in, that the following characters will be most easily recognized; yet the shape of the projectile, and the speed of its flight in passing through the tissues, will cause these features to vary considerably. The establishment of inflammation will, in many cases, efface the marks of distinction; and if the ball is fired near at hand, and pass with great force and speed through the part, there may be no appreciable difference. In some cases, the usual features may be even reversed. The greater the speed, "ceteris paribus," the less the difference. Further, putrefaction obliterates the distinctions below noted.

It is in the case of round balls passing at moderate or low speed, that the characters distinctive of the wounds of entrance and exit become appreciable.

| | **Entrance Wound.** | **Exit Wound.** |
|---|---|---|
| 1. *Size.* | Same as or smaller than the ball. | Larger than the ball. |
| 2. *Shape.* | Regular, round or oval (triangular if ball conical). | Irregular, flap-like tearing. |
| 3. *Lips.* | Inverted more or less. | Everted more or less, and protrusion of sub-cutaneous fat or shreds of tissue. |
| 4. *Surrounding Parts.* | Considerably discoloured (sometimes by powder), may be dark or even livid. From conical balls in full flight there is however seldom much contusion. | Little discoloured and bruised. |
| 5. *Loss of Substance.* | Part of the skin removed, and carried into the wound. | None in the first instance. |

If the ball has been flattened against a bone within the body before escaping, it may give to the exit wound much irregularity; and, if the ball carry in a foreign body with it, the entrance wound may be much larger than usual, and variously shaped. The splitting of a ball within the body, and its escape in portions, will still further vary the relative characters of the apertures. Occasionally an examination of the clothes will enable us to recognize some of the features of the two wounds above described, when they have been effaced from the tissues.

The cicatrix of the wound of entrance, from there having been a loss of substance, is well marked, white and depressed, and often adherent; while that of exit is small, frequently a mere irregular non-adherent spot, if there has been no more destruction than that caused by the ball itself.

GOITRE. *See* THYROID GLAND.

HEMATOCELE. *See* TESTES and CORD.

**HEMATURIA**, or hæmorrhage from the urinary organs, is only a symptom of some disease or lesion in those organs, and the surgeon has two questions to determine concerning it. First, is it in reality blood which is observed in the urine? and secondly, what is its source—from what portion of the urinary passages does it come?

*First, the presence of blood* in the urine is sometimes easily and immediately determined, by the large amount present putting its existence beyond all doubt; but when it occurs in small quantity, and is diffused throughout the urine, it is not always so easily detected. It may be passed pure, flowing in greater or less quantity, or it may be mixed with pus or mucus, or epithelial debris.

The colour blood imparts to the urine will vary much with the amount present, and the recentness of its effusion. It may have a very faint tinge of blood—it may be sooty, or smoky, or brownish black—it may have a resemblance to port-wine, or be pink, "like the washings of flesh." Sometimes the blood appears in clots floating in masses, in urine which is little changed. In the latter case it will generally be found to have been poured out by many small vascular spots on the wall of the bladder. In other instances the blood forms a layer at the bottom of the utensil, like red or black currant jelly. Sometimes it coagulates in the bladder, so as to fill and block it up, and present an obstacle to the escape of the urine. If under such circumstances it becomes decomposed, it gives a most offensive odour to the secretion. If judged of merely by the colour, we might mistake for blood the urine excreted after the ingestion of certain articles, such as logwood, sorrel, beet-root, prickly pear, madder, and, in alkaline states of the urine, rhubarb, and senna. Bile, too, if present in quantity, may give the urine a colour resembling blood, a mistake at once discovered by adding nitric acid to a sample, when the bile becomes green. The dark colour of the urine in jaundice, when contained in a deep vessel, is resolved into a yellow by dilution.

To determine the presence of blood in the urine, the use of the microscope is certainly the easiest, most rapid, and satisfactory method, especially in cases in which the blood has been recently effused. The corpuscles are then easily found, when the urine has been allowed to rest and the blood to sink. The blood discs are rarely seen in columns and combined, unless the bleeding has been free and recent, but they are found separate, generally of an irregular outline, of similar size, yellow colour, and having a non-granular surface. We may further employ certain tests to confirm the opinion we have been led to form. A piece of white blotting-paper, or linen rag, if dipped in the fluid gets stained red ; heat and nitric acid throw down a flocculent, dirty, brownish gray precipitate of albumen and colouring matter, while the supernatant liquid retains its natural colour. The addition of sub-carbonate of soda to the urine heightens the colour of the blood. The relative amount of albumen and blood should be noticed, as there may be albuminuria present as well as hematuria, and this will be shown by the precipitate thrown down by heat being greater than the blood mixture can account for.

*Secondly*, as to the *source of the blood*, it may proceed from any portion of the urinary tract—from the urethra, prostate gland, bladder, ureter, or kidney. In the female its depending on part of the catamenial fluid, or other uterine bleeding, or on hæmorrhage from the vagina mixing with the urine, must be always kept in view. In such cases it will not be at all intimately mixed with the secretion, but will appear as if the blood had been introduced into it externally to the body.

Hematuria may be mainly due to impoverished blood, which is easily effused, as in depressed states of the system, resulting from inappropriate or insufficient food, exposure to marsh miasm, &c. Hematuria is, however, not common in genuine scurvy. The mixture of the blood with other effusions, such as pus, epithelial scales, cancer cells, &c., must be carefully noted from their bearing on the case.

*Urethra.*—When the blood flows continuously or in drops, unconnected with the act of micturition, and when it precedes the stream of urine, its source is probably some part of the urethral canal. It may be caused by acute congestion or inflammation of the mucous lining of the passage; by laceration, irritation, or other injury, resulting from the presence of a foreign body, or the use of instruments. It is at the bulb that such lesions are most apt to be situated, but they may occur at any part of the canal. Bleeding from the bulb may appear just with the last expulsive contraction of the ejaculator urinæ. Bleeding by exhalation from the urethra is said sometimes to arise from a determination to the part analogous to the menstrual flow, and also occasionally to take the place of the blood discharge from piles. It is more frequent, however, for the bleeding to take place from the bladder under these circumstances, and it is said to relieve uneasy feelings previously much complained of. Violent, and even fatal hematuria, may arise from an abscess communicating with the urethra. When the bleeding takes place from the posterior portion of the urethra, the blood may flow backwards into the bladder and there coagulate, and thus, when it is expelled, the real source of the hæmorrhage may be misunderstood.

*Bladder.*—Here the blood is not intimately mixed with the urine, but escapes fluid, or in clots, after the urine, which again may be more or less coloured by it. Occasionally the urine flows quite clear, and the blood comes pure after it.

The clots of blood may be minute and fall to the bottom of the vessel like grains of gravel, then the bleeding has probably taken place from many minute detached spots, as in fungus disease.

The conditions of the bladder which may give rise to hematuria are numerous, and each will evidence its presence by symptoms peculiar to itself.

(*a*) Acute cystitis. Then we will have the symptoms noted at p. 119.

(*b*) Chronic cystitic, or irritation short of actual inflammation, depending on gout; long residence in hot countries (it is said to be endemic in the Mauritius, Egypt, the Brazils, and at the Cape); retention of urine from any cause; much fatigue on horseback; driving in ill-suspended carriages, &c.

(*c*) Foreign bodies in the bladder. *See* CALCULUS, POLYPI, &c.

(*d*) Fungus disease, see p. 121. The bleeding is then copious, returns frequently, is quite florid, and in clots; and the patient is cachectic. Shreds, too, of the disease may often be detected in the urine.

(*e*) Ulceration.

(*f*) Varicose veins at the neck of the bladder (very rare).

(*g*) Exhalation, as vicarious of the menses or piles. Its periodicity—its substitution for the other discharge—its influence on the general health, and the absence of any other cause, will point to this source of the hæmorrhage. Hematuria is said also to occur at times from the bladders of old men, even when no structural change can be discovered to account for it.

The microscopical examination of the urine will not only enable us to recognize, in such cases as the above, the presence of the blood, but will also distinguish any other deposits with which the blood may be combined, and thus assist us greatly in determining the cause giving rise to it. In this way vesical epithelium, cancer cells, casts from the kidney, shreds of mucous membrane, pus, &c., may be found, and will all be instructive.

*Ureter.*—Irritation of this canal by calculi or sand may cause hematuria. Then we will have those signs which are characteristic of such an affection present, viz. weight and pain in the loins, cramp in the thigh and leg, retraction of the testicle, nausea, vomiting, &c., and possibly fibrinous casts of the tube found in the urine.

*Kidneys.*—Here the blood will be uniformly and intimately mixed with the urine, and will flow along with it, unless it has previously passed slowly into the bladder and there coagulated, so as to be expelled in clots, when the distinction as to its source will be made, by observing the other symptoms referable to affections of the bladder and kidney respectively.

The conditions connected with the kidney which may cause hematuria, are as follows:—

(1) Inflammation: Evidenced by pain, tension, &c., in one or both lumbar regions (in one only most commonly), possibly numbness in the thigh, lassitude, and anxiety, irritation of the digestive organs, retching, &c.

Exudation cylinders of Bellini's tubules, or of the ureter also, like slender worms, will probably be found in the urine mixed with epithelial scales. The presence of these blood-casts is quite distinctive of a renal source. If the source of the blood be the pelvis, or calices of the kidney, there may, however, be no such casts.

(2) Congestion from checked cutaneous exhalation or other cause, or the irritation of calculi, especially when lodged in one of the cones, or in the cortical substance of the gland. The hematuria will, when it is due to an arrest of the cutaneous perspiration, usually be accompanied by general (and it may be sudden) œdema; and when caused by calculi it is irregular in its appearance, and comes on after a concussion which has partially dislodged the stone. It is the movement and not the mere presence of a stone in the kidney which causes bleeding, and this accounts for the irregular attacks of hematuria in such cases. The excessive secretion of oxalic or lithic acid may also so irritate the kidney as to give rise to hematuria.

(3) Scarlet fever, especially when the eruption on the surface has been slight, and the poison is chiefly eliminated by

the kidney. Hematuria occasionally appears in the early stage of the disease, but is usually not observed till the poison is being extruded from the system. It is always accompanied with more or less general dropsy, and a pasty unhealthy look of the surface The amount of blood passed in such cases may be very small, or exceedingly copious. In rheumatic fever and gout, from the action of these blood poisons on the excretory organ by which they are chiefly thrown out, we may also have bloody urine.

(4) Congestion in the cold stage of an ague.

(5) In affections in which the blood has become thin and impoverished, as from low diet and unsuitable food, typhus fever, the plague, purpura, the paludal poison, measles, hæmorrhagic diathesis, &c.

(6) Malignant disease of the kidney.

(7) Irritation from the use of cantharides, savine, turpentine, or the abuse of diuretics generally.

(8) Contusions of the loins and wounds of the kidney.

Sometimes we have hematuria occurring without any accompanying symptoms to guide us to its source. It will then arise either from congestion of the mucous membrane of the bladder, calculus impacted in the kidney, or malignant disease of that organ. Gastric irritation and constipation of the bowels may be present in malignant disease of the bladder, and alone attract attention till hematuria sets in. The microscopic examination of the urine will probably detect cancer debris in the secretion, if there is malignant disease.

If there is slow and profuse bleeding into the bladder, and coagulation of the blood there, the viscus may become distended by it, and blanching and other general symptoms of loss of blood may become apparent. There will be weight and fulness in the hypogastrium, frequent desire to micturate, and clots, or pure blood, or smoky urine, will be evacuated.

In some rare cases hematuria has been apparently due to mental irritation and excitement alone, as it appeared whenever such influences were in action, and vanished on their removal, and no other cause could be discovered to account for the phenomenon.

**HERNIA.**—Rupture. The protrusion, more or less complete, of some organ into or through the walls of its containing cavity. It is protrusion of the abdominal organs that is alone considered here. Hernia takes place at certain parts of the abdominal parietes, either in consequence of the resistance made by these parts to the normal pressure within being diminished from any cause; or to the pressure of the viscera against the walls being augmented (especially if suddenly), while the resistance remains the same; or yet again, it may be due to a combination of these causes. There are certain parts of the abdominal parietes which from their anatomical formation, or from giving passage to blood-vessels or other structures, are naturally weak; and as to the viscera which are protruded, it is especially those which are most movable that are most liable to displacement. It is with those parts of the parietes where a natural weakness exists that the most movable, and therefore the most easily protruded, portions of the viscera come into contact.

Hernia may take place at any part of the abdominal wall, which has been wounded, and so weakened. It is, however, at those apertures by which the abdominal cavity communicates with other parts or cavities external to itself that a protrusion generally occurs. Thus at the diaphragmatic openings leading into the chest—at the inguinal rings leading to the groin, scrotum, or labium—at the crural opening leading to the upper part of the thigh—at the thyroid foramen communicating with the upper and inner aspect of the thigh—at the ischiatic foramen leading to the hip—and at the lower opening of the pelvis leading to the perineum, that protrusions of the bowels are met with. Of the situations above noted, hernia is most apt to occur at the inguinal and crural openings, both because of the natural weakness of these parts and the ready contact of movable viscera with them, and also from the peculiar anatomical position of these rings, placed as they are at those portions of the abdominal wall where viscera submitted to pressure come to bear with most advantage. Along the muscular intersections; at the umbilicus; the roof and side of the vagina, there are also parts where the resistance to protrusion is less than at others.

The omentum and ilium are most liable to displacement, but any of the contents of the abdomen, except the duodenum, liver, and pancreas, may be displaced from the cavity and come to occupy a herniary sac.

The nature of a herniary tumour is recognized by—

(1) Its position being at one of the rings or pelvic apertures, at the umbilicus, tendinous intersections of the muscles, or where the walls have been weakened by a wound or any other cause.

(2) By the characters of the swelling, as given below.

(3) By the history of the case. Its coming from within the abdomen, often suddenly after an effort, and forming from above downwards.

(4) By the general symptoms which it gives rise to, and the special symptoms which are produced by the interference with the function of the organ which is protruded.

### Signs of Reducible Hernia.

A tumour in the walls of the abdomen, presenting the following characters:—

(*a*) *Shape.*—Varies. Generally round, pyriform or oval, or elongated.

(*b*) *Sensitiveness.*—Indolent.

(*c*) *Consistence.*—Usually soft, smooth, and elastic (unless containing hardened fæces, when it is irregular and knobby). When it consists of omentum it is less elastic and more irregular to the touch.

(*d*) *Mobility.*—Immovable. If far protruded the neck will be the part fixed.

(*e*) *The skin* is unchanged and free.

(*f*) *The size* varies much, from that of a small recent hernia to a large old protrusion.

(*g*) The size and tension are increased on standing, coughing, or any effort by which the bowels are pressed on, while, on the other hand, they are diminished by lying down. The impulse on coughing is excentric and expansive, and not a mere forward thrust, such as we find in the abdominal walls. It occurs in the axis of the canal through which the protrusion has taken place, and is a dilating motion. It is most observable in protrusions of the small gut, and least in thick omental hernia. If there are adhesions in the sac it is diminished, and it is increased by effusions and by the presence of masses of scybalous matter floating in large protrusions. If the neck of the sac is wide, it follows quickly on the cough, but if the neck is narrow, it is perceptibly delayed.

(*h*) The tumour is *returnable* into the abdomen on pressure being made, and its return is sudden and accompanied by a gurgle, when it is intestine, and slow and without sound when it is omentum.

(*i*) *It reappears after* reduction, on the patient resuming the erect posture, especially if an effort is made at the same time.

(*k*) When reduced *the finger can be passed* into the canal, and on the erect posture being assumed the bowel follows the finger as it is withdrawn.

(*l*) A herniary tumour is *opaque* as a rule, though in very rare cases in young children it may be transparent. In such instances the folds of the gut will be seen as dark lines intersecting the tumour.

(*m*) On percussing a hernia *laterally*, a clear sound is heard if the contents consist of bowel, and a dull note if they are omental.

(*n*) There are *uneasy feelings* usually in the abdomen, and the *function of the intestinal canal* is frequently disordered.

When the protrusion is very slight and only at the inner ring, or when it is intra-parietal, it is far from easy to recognize it, and it is yet more difficult to discover a mere *tendency* to it, which may be all that really exists. The best way to determine the existence of so slight a protrusion is by sight. Placing the patient in a good light, we expose the abdominal wall, and make him stand on the fore part of the foot and cough. A very slight amount of protrusion will be thus seen, and that too when it can hardly be *felt*. A comparison of the two sides of the abdomen and an examination of the part in profile will render the detection easier. Further, if the bowel enters the canal it can be felt to slip back before the finger when it is introduced within the ring.

We are able in most cases to determine the nature of the contents of a hernia by observing that when we have to do with *intestine*, and the hernia is recent, or when it is a protrusion in which the structures remain unchanged, the tumour yields a smooth, even, elastic feeling to the hand. The impulse on coughing is clear and sharp. It is resonant on percussion, and the function of the intestinal canal is more or less interfered with. There will most probably be colic, nausea, and vomiting. The movements of the gas in the tumour and borborygmi in the abdomen are observed, and the tumour being reduced enters suddenly and with a gurgle. It is in protrusions of the small intestine that the most violent symptoms arise, and according to Laugier the distension and increased resonance are then first observed in the hypogastric and umbilical regions, while when the great gut is occluded, these signs will first appear at the circumference of the abdomen. When the colon is engaged, lavements cannot be introduced beyond a certain height; and when the cæcum is protruded, the signs of intestinal annoyance come on slowly, and are not so violent as in the case of the small intestines.

When, again, the protrusion consists of *omentum* (which is rare in the hernia of the young), we will find that it is most common on the left side. It feels irregular, doughy, and flabby. It is weightier and more incompressible than bowel. It is dull to percussion; is not (at least rarely) accompanied by any intestinal embarrassment, although an uneasy feeling of dragging in the loins is frequently spoken of; and it does not vary in size and consistence in different postures. This form of hernia is more difficult to reduce, and when reduced returns slowly and by degrees (in portions) and without any gurgle. It is more difficult to keep reduced when it has been returned. In inguinal omental hernia, Velpeau points out how a tense chord fixed at one end on the scrotal side, and extending up to the iliac fossa, may be felt to traverse the canal.

When intestine and omentum are both present in the tumour the indications above described will be differently combined; and when the hernia is an old one, and its contents are changed in their character, the above signs will be little if at all distinguishable.

*Incarceration.*—Occurs in old herniæ, which are irreducible when the circulation of the contents of the inclosed bowel is interrupted by any cause either existing in the nature of the contents themselves (foreign bodies, worms, hardened fæces, &c.), or in the containing bowel (inflammation chiefly). When bowel becomes incarcerated, the size, tension, and weight of the tumour increase, it generally retains some impulse on coughing, and there is much discomfort in the abdomen. There is more or less complete constipation, sickness, vomiting of food and then of bilious matter. There is not the same tension of the tumour, nor pain in it or in the abdomen, nor yet the violent acute symptoms which attend the strangulation of a recent protrusion; and if the case does not eventuate in strangulation, the passage of the bowel will be spontaneously re-established.

*Strangulated Hernia.*—A hernia may become strangulated (*i.e.* the protruded part may become constricted so that the circulation of blood and intestinal matters is arrested) at the time of its protrusion, or this accident may occur in the case of an old hernia at a later date. The causes and mechanism of strangulation do not fall to be considered here.

The symptoms indicative of strangulation are local and general. The former are alone present at the outset, and latterly the constitutional symptoms are the more clamant, and are most severe and early established when it is intestine which is involved, and the strangulation complete and quickly established.

The state of the tumour varies. If it is composed of intestine its tension increases. It gets hard and painful, and is not returnable into the abdomen. If it consist of omentum alone, it often remains soft and doughy to the touch; but in either case there is a sense of constriction and uneasiness extending from the tumour up into the abdomen. The integuments, at first free, become œdematous and ultimately the seat of inflammation. There is no impulse on coughing distal to the point of constriction, and the hardness and tension are limited in like manner to the portion of the bowels affected by the strangulation. Constipation is established, though the lower bowel may be emptied after the strangulation has set in. Colic, nausea, hiccup, vomiting,—at first of food and bilious matter, ultimately of stercoraceous matters, having the colour and consistence of pea-soup,—set in. The retching is often violent, and the abdominal walls are hard and tense. As inflammation appears and involves the general peritoneum, tenderness to the touch, distension, and tympanitis are marked in the abdomen. The distension may be confined to the portion of the abdomen above the place of the strangulated intestine before the peritonitis sets in. After that peritonitis is established, the distension becomes general. The knees are drawn up and the body bent forward, to relieve pressure. The pulse gets small, concentrated, hard, and often intermittent. The tongue becomes dry and brown, the face anxious and pinched, and the eyes hollow and dark. The general prostration is great. Sickness and vomiting is the rule, though occasionally in exceptional cases they may be absent. Sometimes there is none so long as the stomach remains empty and the patient lies quiet.

If gangrene seizes on the protrusion, the pain will cease in the tumour, which may give an emphysematous crackle to the hand when palpated. The prostration becomes more intense, the pulse intermits, hiccup becomes distressing, and delirium adds a shade to the picture. If the gangrenous part is expelled, it is by the formation of an abscess and its bursting on the surface; and thus a spontaneous cure may result with or without a stercoraceal fistula or a false anus, according to the contents of the hernia. If the bowel give way, the violent pain will undergo remission, but acute and more rapid peritonitis, attended by much distension and great prostration, leads to a rapid extinction of the vital powers.

The strangulation of a hernia is distinguished from the inflammation of an irreducible protrusion, by the following signs:—

(1) The past history of the case. An irreducible hernia rarely becomes strangulated, while it is not uncommon for it to become inflamed. Strangulation is most apt to appear in recent protrusions, and inflammation in old large herniæ.

(2) It is in protrusions composed of intestine that strangulation is most apt to occur, and in those composed of omentum that inflammation most commonly appears. It is femoral hernia in women that is most liable to strangulation, and scrotal hernia in old men that is most apt to become inflamed.

(3) The pain in a strangulated hernia is much greater than in an inflamed one.

(4) The inflammation comes on slowly and by progressive steps—not suddenly, like strangulation.

(5) In strangulation the tumour is usually tense, small, and uniform, and not unfrequently the skin over it is œdematous or inflamed; while in inflammation the tumour more commonly is large, supple, irregular, free from œdema, and long remains of natural colour and consistence.

(6) In strangulation, the tumour, if it pre-exist, augments in volume; while in inflammation it does not.

(7) The vomiting is more constant and violent in strangulation, and it is rare that in inflammation the matters vomited are stercoraceal.

(8) By introducing the finger into the ring (which is small), the point of strangulation may be frequently determined; but no such constriction can be discovered in inflamed hernia, though the ring is usually large from the protrusion being old.

(9) Constipation is more absolute and constant in strangulation. Liquid fæces and flatus often pass in inflamed hernia.

(10) Abdominal tenderness is less in inflamed hernia than in strangulated.

(11) Fever sets in earlier and is more marked in strangulation than in inflammation.

(12) Strangulation, if unrelieved, generally ends in gangrene—inflammation usually in resolution.

It must, however, be added that while in typical examples of the two affections we have little difficulty in thus distinguishing strangulated and inflamed hernia, yet that many intermediate cases occur in practice in which it is difficult or even impossible to come to a satisfactory decision as to the true condition of the tumour. Each and all of the distinctions may fail us at the bedside, and some may even, in rare cases, be entirely reversed, and further, we may have both conditions simultaneously or successively present; yet in the majority of instances a certain number of the above-enumerated distinctions will be found to guide us to a just estimate of the malady.

*Strangulation.*—May be distinguished from mere obstruction by its occurring usually in recent hernia, and not in old large irreducible protrusions; by the greater violence of the symptoms, and of the pain and tension in the tumour; and by the greater tenderness and enlargement of the abdomen; by the complete constipation and the early presence and greater violence of the vomiting. The vomiting, too, is stercoraceous in strangulated hernia; while in mere obstruction, if there is vomiting at all, it consists only of the contents of the stomach and of bile. There also remains a certain impulse on coughing in cases of obstruction, and the affection usually disappears spontaneously.

When, then, an old irreducible hernia becomes obstructed, the symptoms are chronic. There is not the same tenderness in the protrusion or in the abdomen as when bowel is strangulated, nor the same early and violent vomiting or rapid prostration. The constipation is not usually so complete, and a certain impulse remains in the tumour. When peritonitis is coincident with an irreducible hernia, it is often most difficult to determine its non-connection with the protrusion. That it does not depend on any intestinal obstruction in the hernia will be shown by the constipation not being obstinate; by the vomiting not being severe and protracted; and by the non-rejection of stercoraceous matter. If the abdominal tenderness has not its centre at the place of protrusion, but at some other portion of the abdominal walls; if there are no signs in the tumour itself which would lead to the idea of its having become the seat of strangulation, then we may conclude that the symptoms are due to peritonitis. In many cases, however, it will be impossible to draw the distinction.

**Inguinal Hernia.**—(1) *Oblique.* External to the epigastric artery, which may in some cases be felt beating to the inner side of the passage, if the finger can be fairly passed into the canal. This form of rupture is most common on the right side, and in men. It follows the cord, and, in recent cases, lies in front of it, while in old cases it may separate the various components of the cord from one another. When complete, the tumour of an oblique inguinal hernia is oblong or oval or bottle-shaped. It is placed obliquely from below and within upwards and outwards. The larger end is downward, and its neck is within the canal. This neck is narrow in recent, and broad in old hernia. In the latter, too, the direction of the protrusion is no longer oblique, but becomes vertical, being directed straight upwards and backwards into the abdomen. It presents the physical characters described at page 295. The cord can usually be felt behind, and internal to the neck, and the testicle can be detected below and behind. If the protrusion descend into the scrotum, it may attain a very great size.

(2) *Direct.*—Internal to the epigastric artery, which may be distinguished beating to the outer side of the passage, after the protrusion is returned, if the finger is introduced into the canal. This hernia has no oblique direction, but presents a tumour of a globular form, which, on being reduced, passes straight back into the abdomen. The cord lies on its outer side, and it seldom (unless it is of long standing and is large in size) passes down into the bottom of the scrotum, but remains near the external ring.

To distinguish an oblique from a direct inguinal hernia is not difficult in recent cases. The direction of the neck—the position reached by the tumour—its relation to the cord and the epigastric artery—the direction of the canal, after reduction, &c., will enable us to judge of its true character; but in old cases, when the neck of an oblique hernia has become broad and the ring drawn together, so that its obliquity is lost; or when, in direct hernia, the protrusion passes downwards to the bottom of the scrotum, the distinction may be impossible.

Inguinal hernia may be confounded with the following affections:—

(*a*) Sarcocele.
(*b*) Hydrocele of the tunica vaginalis.
(*c*) Hydrocele of the cord.
(*d*) Bubo.

(*e*) Chronic abscess.
(*f*) Varicocele.
(*g*) Undescended testicle.
(*h*) Hematocele.
(*i*) Inflammation of the cord.
(*k*) Solid tumours.
(*l*) Cysts.
(*m*) Glands.

(*a*) *Sarcocele.*—If confined to the testicle, we will have, besides the history and progress of the affection, the freedom of the cord and the inguinal canal to guide us; also the absence of impulse on coughing; its not being reducible; its being uniformly hard, heavy, and irregular to the touch; its being often painful, and there being no derangement of the intestinal functions. If the growth pass upward into the abdomen, or the cord is much thickened, there will yet be no grounds for confusion, as the physical characters of the tumours are quite different and the progress in either case not the same.

(*b*) *Hydrocele of the tunica vaginalis.*—This is usually more regular in its shape (pyriform), its base being below; it is softer and of greater uniformity of consistence; slower in formation; gradually growing from below upwards; not descending, like a hernia, from the ring; having usually a clear space between its summit and the external ring, where the cord can be felt clear of the tumour. If it passes into the canal, the finger can generally be passed into the ring, which it cannot be in hernia. There is no greater abdominal uneasiness in hydrocele than is explicable by the mere mechanical weight of the tumour. There is no impulse on coughing, and its bulk is not liable to variation in size. It is not reducible, and not affected by position. It is transparent (unless the sac is much thickened), and there is fluctuation. If it be necessary, the exploring needle may be employed further to determine its true character.

In congenital hydrocele the signs of distinction are not so evident as those above referred to. It is reducible, but slowly and gradually; not abruptly, as a herniary tumour. There is no gurgle observed as it is being reduced. It is transparent, and fluctuates. The grooved needle, too, may be employed in cases of obscurity.

Hernia and hydrocele may, however, be combined, there being a neck or constriction between them. In this case each tumour will present the characters which belong to itself. The hernia may lie somewhat behind the hydrocele. This is the usual position in direct hernia, but in oblique hernia it will probably be in front.

(*c*) *Hydrocele of the cord.*

*Encysted.*—If below the external ring, there can be no difficulty; but if it is in the canal, the recognition may not be so easy, especially if its peculiar characters are not well defined. Like hernia, hydrocele lies in front of the cord, and the testicle is below. It is circumscribed, tense, irreducible into the abdominal cavity; but if it can be passed up the canal, there is no gurgle observed, and it is rapidly reproduced when the pressure is removed, even without any effort on the part of the patient. If, after being pushed up, we firmly grasp the cord between the fingers, below the swelling, and make the patient stand, the hydrocele will reappear, but a hernia will not. This tumour is transparent (a test, however, which is here very difficult to apply, and needs much care), is of uniform size at all times, forms slowly, and is not attended by any intestinal derangement. If the testicle be moved from side to side in the scrotum, it will be found to communicate its movements to the tumour.

*Diffuse hydrocele.*—Cannot be wholly or completely reduced. We cannot define the cord clearly. There is no distinct impulse on coughing.

(*d*) *Bubo.*—The history and progress of the case will here be most important. With signs of inflammation a tumour forms, having no impulse, and not being reducible. It is not limited to the usual axis of a herniary protrusion, and in its early stage is movable and more superficial than a hernia. It is first hard, and then fluctuates, and is accompanied by pain and œdema. There is no intestinal disturbance, and there will probably be found some source of irritation to account for its presence. Cæcal abscess and suppuration in connection with the spermatic cord may in rare cases simulate a hernia.

(*e*) *Chronic abscess.*—This, though seldom coming through the ring, may yet be occasionally observed to proceed from the abdomen. When in the canal it is occasionally reducible into the abdomen; and that, perhaps, with an obscure gurgle, so that it has not unfrequently been mistaken for hernia; but the presence of fluctuation, the absence of the consistence of a hernia, the co-existence of vertebral or pelvic disease, and the absence of intestinal trouble, will point out its nature.

(*f*) *Varicocele.*—This tumour is recognized by the peculiar characters described at p. 176. The absence of impulse (in general, though occasionally it has an indistinct one when the affection implicates the higher portions of the cord); the peculiar sensations communicated to the hand on rubbing the cord between the fingers; the bluish colour of the skin often present; its being reduced slowly and reappearing (coming up from below) after reduction, even though the ring is closed, when the patient stands up, or by mere muscular exertion, without the erect posture being assumed; and lastly, the effects of heat applied to it—will all render evident the nature of this swelling, and serve to distinguish it from hernia. Pressure in such a case should be applied gently to the ring, otherwise the varicocele may not appear, the veins remaining empty. A combination of epiplocele and varix is sometimes very confusing; as on the patient lying down, the veins become emptied, but the omentum does not so quickly disappear. The distinction between the two elements in the tumour is to be made by careful examination, when their consistence and respective characters can be made out. The doughy mass of the omentum retaining an impulse on coughing, and receding slowly before the finger, is easily recognized from the dilated tortuous veins, which are emptied and filled by position and pressure.

(*g*) *Undescended testicle.*—An oval-shaped body lying in the canal, having the consistence of the testicle, causing on pressure the peculiar sickening sensation experienced when the testicle is compressed; the absence of the gland from the scrotum, and the undeveloped state of the bag on that side; the tumour not being increased or diminished by position; its being irreducible; or if reducible, there being no gurgle accompanying its return. These are the characters by which it is recognized. If sympathetic irritation of the digestive organs exists, the vomiting and constipation are not persistent.

(*h*) *Hematocele of the tunica vaginalis.*—Here there will be an account of injury received. The tumour is firm and opaque, has no impulse; and the cord is clear above. The skin will probably be discoloured.

(*i*) *Inflammation of the cord*, causing a tumour in the canal. There will be signs of inflammation preceding its formation. There will be no indications of intestinal derangement accompanying it. It is harder and more elongated than hernia, and is irreducible. It gives no impulse on coughing, and is painful to the touch.

(*k*) *Solid tumours.*—These may be in the canal, or external to the ring passing into the scrotum. They may be fatty, cancerous, &c. Fatty tumours may form in the substance of the cord, or come from the subserous cellular tissue of the abdomen, and lie either before or behind the cord. The history and progress of the case; the form and consistence of the tumour; its circumscribed character; its having no impulse (at least, no expansive impulse) on coughing; if below the ring, the canal and cord being free; its being seldom reducible; and if so, then without a gurgle; and its reappearing again without any effort when the pressure is removed—are all important points in the diagnosis. If the tumour is innocent, then it may cause no disturbance by its growth, except that produced by its mechanical influence; and unless inflamed, it causes no functional derangement in the abdomen. In some instances, however, the distinction is not so easy.

It may be also mentioned, as a very rare occurrence, that a varicose enlargement of the lymphatic vessels in the groin has been mistaken for a hernia. The spongy, soft, elastic nature of such a tumour, and the history connected with it, should, however, distinguish it.

(*l*) Cysts formed either on the cord, or resulting from the closure of the communication between an old herniary sac and the abdomen, may cause some difficulty in certain instances. They are defined in outline, globular, tense, not reducible, having no dilating cough impulse, and they have a distinctive history. Finally, if it be thought necessary, an exploring needle may be used to clear up any obscurity.

(*m*) Enlarged glands have been often confounded with a hernia. This is especially apt to occur in femoral hernia; but it may also take place in inguinal. There is one gland especially which lies to the pubic side of the internal ring, which occasionally inflames and enlarges, and this may be accompanied by nausea and constipation. But the glandular tumour is more defined in its outline than a hernia, is more superficial, is more pasty and fleshy to the touch, has possibly an irregular margin, is movable, does not present the other characters of a rupture, and may generally be connected with some irritation, especially about the superficial parts of the penis or scrotum. A scrofulous diathesis, and the presence in other parts of glandular enlargements, will further assist our judgment.

**Congenital Hernia.**—The transparency and fluctuation of the upper part of the tumour is especially apt to cause confusion between it and ordinary hydrocele; but on pressure this fluid is reduced without difficulty and without a gurgle; leaving an intestinal portion, which is more consistent and firm to the touch, to return afterwards with a gurgle, if the pressure is kept up; and then the irreducible testis (which hitherto was wrapt up and concealed by the tumour), can be felt at the ring, and recognized by its shape and the peculiar sensation pressure upon it occasions. Congenital hernia is often of an unequal, irregular shape; and we are able to distinguish in it the presence of various structures of different consistency. When this tumour passes into the scrotum, it usually assumes a globular form, having a narrow pedicle. The testicle is concealed by it, and it assumes a considerable size rapidly. If it occur after childhood, it will generally have pre-existed at an earlier age, or the testicle has been late of descending into the scrotum.

**Femoral Hernia.**—Is usually a small oval swelling lying obliquely transverse in the upper part of the thigh. If very small, from its depth and coverings it may be very difficult to recognize. If after a sudden effort a fixed pain occurs at the point where such a protrusion takes place, and radiates up into the abdomen; if nausea, derangement of the function of the bowel, and vomiting follow; and if no other protrusion is present in any other part—we have great reason to suspect a small hernia in the femoral ring. This suspicion will be strengthened, if there is any swelling or fulness, however slight or obscure, to the inner side of the femoral vessels in the groin, about three-quarters of an inch external to and below the spine of the pubes. By bending the trunk forwards, flexing the leg on the thigh, and the thigh on the abdomen, and adducting it over the other, we gain the most favourable position for investigation. The finger should then be placed in the canal; and by making the patient cough, we commonly will be able to detect the presence of the hernia.

When prominent a femoral hernia is, if small, usually hard and tense; if large it may be soft and doughy. When it exerts much pressure it may cause œdema and numbness in the limb.

Femoral hernia is to be distinguished from (*a*) Inguinal hernia; (*b*) Chronic abscess; (*c*) Indurated glands; (*d*) Varix of saphena; (*e*) Fatty tumour in the canal.

(*a*) *Inguinal hernia.*—It is in the female, when we have no cord to serve as landmark, and when the two rings have been dragged together, and when the femoral protrusion rises up and turns up on the groin, that confusion is most apt to occur. If small the distinction may be clearly made by the round shape, tension, and deep position in the upper and inner part of the thigh of femoral hernia, its being clearly below the line of Poupart's ligament, and the inguinal ring being free. If large, then we must observe

(1) That the shape of the tumours differs. Femoral rupture is round, oval, or elongated transversely to the axis of the thigh. Inguinal hernia, on the other hand, is for the most part bottle-shaped.

(2) If the rings can be explored, either before or after the

reduction of the tumour, then the connection of the protrusion with the femoral or inguinal ring can be made out. In the case of irreducible hernia it will be necessary to draw the tissues first downwards and outwards, and examine the inguinal ring; and then to draw them upwards, and thus get at the femoral ring, in order to see through which the protrusion passes.

(3) The neck of the tumour being in the one case below, and in the other above, a line passing from the anterior superior spinous process of the ilium to the spine of the pubes.

(4) The relationship of the neck of the tumour to the spermatic cord in either case. This can, of course, only refer to the male, in whom the confusion is very unlikely to occur. The cord is placed internal and anterior to femoral, and external and behind inguinal hernia. In females the spine of the pubes, however, which lies below and external to the inguinal ring, may serve as a guide.

(5) The effect which different positions of the thigh have on the tension, size, &c., of the tumour. If femoral hernia is drawn downwards its canal will be seen stretched upwards in front of the sac.

(6) Femoral hernia is not so large as inguinal hernia, is not so tense, more movable, and, in fact, never really mounts so high as inguinal hernia does.

(7) The direction of the cough impulse is different, being downwards, forwards, and inwards in oblique inguinal hernia, and downwards and forwards, or downwards and outwards and even slightly upwards (at the fundus) in femoral, according to its size.

(8) If reducible, and the finger can be inserted into the canal of femoral hernia, the artery will be felt on the external side, and the sharp edge of the falciform ligament distinguished; and further, if, on the erect posture being assumed (while the finger is still in the canal), the protrusion recurs, it cannot be femoral hernia.

(9) In the female, inguinal hernia passes into the labium, while femoral lies in the inner and upper part of the thigh.

(*b*) *Chronic abscess.*—Psoas abscess. In this affection there may be effects produced by position and forced expiration similar to those observed in hernia. Here the history of the case; the pre-existence of deep pains in the loins or back; the previous derangement of the general health; the evidence of a spinal or pelvic affection; the fluctuation; the dull percussion; the impulse being more abrupt; there being no distinct gurgle on reduction; the mass slowly receding without the quick slip of a hernia; there being no embarrassment of function in the intestinal canal—will lead us to the true diagnosis. Psoas abscess also, it may be added, is usually placed externally to the femoral vessels, though it may come to the inner side, as pelvic abscess also occasionally does.

(*c*) *Indurated glands.*—Here the history of the rise and progress of the affection; the absence of those characters which define a hernia; the shape and mobility of the mass; their more superficial position; there being frequently several glands implicated; the presence in the penis, scrotum, or lower extremity, of some irritation to cause such glandular enlargement, are the points to which our attention will be directed.

If the lymphatic glands are inflamed and produce sympathetic vomiting, the distinction will be very difficult, or even impossible.

Hernia may coexist with indurated glands, and then an exploratory operation will alone determine the actual state of affairs.

(*d*) *Varix of saphena.*—If there is an impulse it is not so distinct and clear, and there is no gurgle (properly so called) on reduction. There is a varicose condition of other parts of the vessel, and a discoloration of the skin, and the tumour is augmented by heat, which does not influence a hernia. Further, by reducing varix during recumbency, and making pressure on the canal while the patient stands up and coughs, the varix will quickly reappear; while, in like circumstances, a herniary protrusion will not recur so long as the pressure is maintained. If, however, the varix is small, the application of pressure in the above way may so obliterate it as to render nugatory this test. In that case, if we apply pressure at the ring in such a way as to keep the tumour external to it (in place of reducing it), then examine the pedicle, we will find that if it is a hernia, a hard resistent tumour will be found; while if it be a varix, it will disappear, as the blood will pass from it into the inferior veins.

(e) *Lipoma in the canal.*—The peculiar doughy feeling of such a growth; its shape being not well defined; the history of its rise and progress; the absence of intestinal derangement or of those sensations usually present in hernia; there being no impulse on coughing, and its not being usually reducible, but if so, there being no gurgle, and its not returning again with the same feeling that a hernia does after the finger is introduced into the canal—will lead to its recognition.

**Umbilical Hernia.**—Exomphalos. This is easily recognized. It is peculiarly the form of hernia met with in the infant. It may be congenital, or appear shortly after birth. A round, tense, but soft tumour, usually of easy reduction, and of varying size, situated at the umbilicus. Round its neck the ring can be felt, and there is not always any wrinkling nor appearance of a navel.

It is possible that an affection, to which Sir A. Cooper gives the name of "fleshy tumour of the navel," might be mistaken for umbilical hernia, although the maladies have no real resemblance. The tumour referred to is red, firm, and fleshy, and stands out nipple-like from the navel, being continuous with the skin, and appears on the separation of the cord. Generally it is solid, though occasionally has it a minute canal within it. It secretes a white creamy discharge, and it bleeds easily on irritation. There is no resemblance whatever between this affection and umbilical hernia, except its seat.

A varicose condition of the umbilical vein has been said occasionally to simulate a rupture. This is, however, a very rare affection, and one a little attention will easily recognize. Tumours (fatty, fibrous, &c.) of the umbilicus have no features in common with hernia by which they could be confounded with it.

**Ventral Hernia.**—Occurs generally in the linea alba, or the linea semilunaris. It is of oval shape, has a neck, and the edge of the fissure in the wall can be felt at its sides. The cicatrix of the navel will be seen to the side, or on the protrusion if it be placed near the umbilicus, showing that the hernia has not taken place through it. Small fatty protrusions are not uncommon through the linea alba, both above and below the umbilicus. These very seldom cause any annoyance, or in fact attract attention. In very rare cases these protrusions may become connected or attached to some of the viscera, and so, if accompanied by intestinal disturbance, cause a doubt as to their true character; but their unchanged character, the absence of any of the signs of a hernia, their fixture and history, will distinguish them.

**Thyroid or Obturator Hernia.**—This is a rare affection, but is more frequent in women than in men. It is only when large that this protrusion reaches the surface. When small its recognition during life is hardly possible. It lies at the upper and inner aspect of the thigh, lower and more internal than femoral hernia. In men it is situated near the scrotum; in females near the labium. If the abdominal parietes are very lax, as in the old and in thin persons, and if by position, they are completely relaxed, it is possible to explore the inner extremity of the thyroid foramen from above the pubes. By the vagina and rectum, in like manner, an exploration should be attempted in any case where it is believed that this protrusion is present. It may be only by a careful comparison of the two limbs placed in similar positions, and exposed to a good light, and observing a slight change of contour in the part over the obdurator foramen, or a slight impulse on coughing, that this hernia can be discovered. There will also, in many cases, be a history of previous attacks of pain and constipation, which have spontaneously disappeared, and it is possible that a clear note may be elicited on percussing the tumour.

**Ischiatic Hernia.**—It is only when large that this form of hernia protrudes sufficiently to be recognizable. If it follow the sciatic nerve it appears below the border of the great gluteus, but is so bound down as scarcely to be distinguishable.

**Perineal Hernia.**—In the male appears between the rectum and the bladder. In the female it protrudes between the vagina and the rectum, or at the posterior part of the labium.

**Vaginal.**—Appears at any part of the wall of the canal, but it is chiefly in the posterior and upper part that the protrusion is met with. It has been mistaken for a solid growth, but its expansive impulse, its reduction with a gurgle, its shape and soft feeling, and the functional disturbance which accompanies it, will distinguish it. From prolapsus of the vaginal wall, the same characters as have been mentioned will differentiate hernia.

**Diaphragmatic Hernia** is often very difficult to recognize. Here the intestinal embarrassments, the intense thirst which accompanies it, the results of auscultation and percussion, and the combination of abdominal and thoracic symptoms, will serve to diagnose it.

**HIP-JOINT DISEASE.**—Morbus coxarius. This is chiefly a disease of childhood. It may be acute, but is more frequently chronic, and is very deceitful in its development. At its outset it may attract little notice. A slight degree of lameness; dragging of the limb, or a limp merely; a feeling of weariness after exertion or long standing; and a disposition to rest on the sound limb, when the toes only of the affected leg are brought to the ground, are the signs by which it shows itself. The pain is at first trifling, and difficult often to localize. After the outset of the disease it is probably most marked at the knee, on its inner side, and more rarely on its outer aspect, or behind in the popliteal space. The pain is also frequently deeply placed in the groin, and darts therefrom to the knee; or it exists deep behind the trochanter major, where it is complained of on concentrated pressure being applied. In rare cases the pain has been chiefly observed at the inner side of the foot and in the upper part of the leg. When the disease is fully developed the suffering is great, and easily aroused by any sudden movement which presses the articulating surfaces together. The knee, though pointed to as perhaps the chief seat of pain, is usually free from swelling, and movements cause no uneasiness so long as the hip is kept at rest.

Striking the trochanter sharply, so as to impinge the head of the bone into its socket, or pressing behind the process with the points of the fingers, or over the pectineus; or still more certainly by bending the thigh on the pelvis, and the leg on the knee, and then tapping on the knee, so as to force the head of the femur abruptly into the acetabulum, immediately awakens the pain in the various places where it was before complained of.

The attitude and motions of the patient are characteristic. When lying flat on the back the spine is arched, the knee raised, and the foot rests on the heel. In sitting the patient rests commonly upon the edge of the chair, so as to keep the pressure off the affected hip. In standing he leans on the sound limb, and brings the ball of the affected foot to the ground, and raises the heel. The thigh gets bent and abducted; the foot is everted and advanced on the limb, and may be adducted and rotated inwards. The body. is slightly bent forwards. The spine gets twisted, so as to compensate for the changed position of the limb. There is frequently also a lateral (convexity towards the sound side) and antero-posterior (in the lumbar region) distortion of the spinal column. On comparing the limbs there is at first an apparent lengthening of the affected one, due to the inclination of the pelvis; but if the anterior superior spinous processes are accurately placed in line, and the limbs put parallel to one another, this lengthening will be seen to be unreal. The hip of the affected side when compared with the other will be found to be flattened, and the fold between the nates and thigh to lie lower than usual. There is a fulness in the groin by which its hollow shape is effaced. The flattening of the hip is partly due to the decrease in the muscles of the hip which follows disease, and partly to the abduction of the limb. The muscles of the thigh, too, on the affected side lose their firmness and robustness, and become wasted. The movements of the joint are gravely compromised. Complete flexion of the thigh cannot be accomplished, and abduction, extension, and rotation are very painful. If, when the patient is standing, an attempt is made to flex the leg, the movement will take place by the pelvis revolving on the sound femoral articulation, and not by any movement of the joint we are examining. The difference of motion may be shown by repeating the manœuvre on the sound limb; and it can be proved, by an examination under chloroform, that the fixture of the affected joint is voluntary.

As the disease advances the pain becomes very agonizing on the least motion, and is especially severe at night, when it is usually attended with startings of the limb. Under chloroform a grating in the joint is often observed during motion, if the cartilages are eroded. In rare cases, however, it has been found, that though the cartilages were removed this grating did not exist, in consequence of the bone being covered by soft granulations. The glands in the groin enlarge and inflame. The constitution severely suffers; fever of an irritative or hectic type appears; the sleep is broken; the appetite lost; abscesses form over the hip, or in the groin, or burst near the anus or into the rectum. Shortening, real or apparent, may ultimately take place in the limb. The knee is carried over the sound thigh and bent on the pelvis.

There are various affections with which the foregoing has been confounded.

(*a*) Congenital dislocation; (*b*) Psoas abscess; (*c*) Rheumatism; (*d*) Lateral curvature of the spine; (*e*) Sacro-iliac disease; (*f*) Infantile paralysis; (*g*) Disease of the trochanter major; (*h*) Hysterical affection of the joint; (*i*) Medullary cancer; (*k*) Disease of the crest of the ilium; (*l*) Inflammation of the bursa below the psoas tendon; (*m*) Inflammation and enlargement of the inguinal glands; (*n*) Disease of the knee.

(*a*) *Congenital dislocation.*—This is not attended by pain even on pressure; the shortening is real, and it is increased by pressing up the bone, and diminished by extension. These features will indicate the nature of this affection.

(*b*) *Psoas Abscess:* its position, and special characters, showing its connection with the cavity of the abdomen (See p. 282.)—The site of the abscess, too, is different from that which it assumes in hip disease; and if, by flexing the thigh, we can keep pressure off the tumour, we may move the joint freely without causing pain. Pressing the head of the bone into the socket is not attended with the suffering that it is in hip disease, and the pain is chiefly in the loins, and not at the place it occupies in disease of the hip.

There is, besides this, the usual connection of psoas abscess with spinal disease, and the absence of the flattening of the hip or alteration in the length of the limb seen in hip disease. The age of the patient, too, will throw some light on the case. Psoas abscess is more common in persons of a more advanced age than hip disease.

(*c*) *Rheumatism.*—This occurs at a different age, and its progress is different. There is no alteration in the position of the limb, no flattening of the hip, no abscess, and probably the affection is present at the same time in other articulations besides the hip.

(*d*) *Lateral curvature of the spine*, accompanied by neuralgic pain in the hip.—Firm contact of the articulating surfaces does not augment the pain in this affection, and it is not localized like that of hip-joint disease. There is no flattening of the hip nor alteration in the length of the limb, and the age of the patients is not the same. (See " Neuralgia of the Hip.")

(*e*) *Sacro-iliac Disease.*—Here, when the head of the bone is pressed into its socket, there is no pain if the pelvis is carefully fixed, and the thigh can then also be freely moved; but if the precaution of fixing the pelvis is neglected, then there is violent pain—not at the hip, however, but at the sacro-iliac articulation, where it is immediately called forth by movements or by pressing on the wing of the ilium. The obliquity of the pelvis cannot be overcome by position in sacro-iliac disease, as it can in hip-joint disease; and any alteration of length observed lies above the hip, and is not to be determined by measuring from the anterior superior spinous process to the knee, as in hip disease.

(*f*) *Infantile Paralysis*, causing wasting and shortening of the limb and lateral curvature of the spine. Here the history and the results of examination will discover the true state of matters.

(*g*) *Disease of the Trochanter Major.*—Inflammation of the bursa over the trochanter, or of the bone itself, causing swelling and much pain on motion, lameness, elevation of the side of the pelvis, the formation of abscesses, &c. Here the age is different, as this disease occurs in adults, especially those of a gouty or rheumatic disposition. The evidence of a rheumatic or gouty diathesis, the fold of the hip remaining normal, and the absence of pain at the inner side, and the general features of the disease at its outset, will lead us to recognize it. If abscess forms and bursts, or a sinus exists, then no difficulty can be felt in discovering the true nature of the disease.

(*h*) *Hysterical Affection.* See "Neuralgia of the Hip."

(*i*) *Medullary Cancer. See* Tumours for the characters of this growth.

(*k*) *Disease of the Crest of the Ilium.*—In this case the seat of the pain is different. There is no change in the position or length of the limb. The joint retains its movements. There is no flattening of the hip or fulness in the groin, and if sinuses exist, the probe will lead us to the disease.

(*l*) *Inflammation of the Bursa* below the psoas.—This sac may communicate with the joint, and so the disease be transmitted from the one to the other. When the bursa alone is affected, and forms an obscure tumour or swelling at the upper and inner part of the thigh, there will be pain on pressure, and the patient will, to prevent such pressure, flex the thigh on the pelvis and keep it so; but if, when so flexed and the psoas relaxed, we press the head of the bone into the socket, no increase of pain will result, nor will there be in the hip or state of the limb any of those characters of coxalgia before described.

(*m*) *Inflammation and Enlargement of the Inguinal Glands.*—While it is always to be remembered that these glands frequently become enlarged, in consequence of disease within the hip-joint, yet cases every now and then occur in which, without any hip-joint disease, a little patient suffering from painful glands in the groin will keep the joint stiff, and in walking and standing closely simulate disease of the joint. From the thigh, too, being abducted, a certain appearance of flattening may be given to the hip. We recognize the nature of the ailment by observing the glands enlarged, and finding a source of irritation to account for them other than disease in the joint; the absence of pain when the limb is bent (so as to remove all pressure from the groin) and jarred against the articulation, or when pressure is made behind the trochanter; the absence of the other symptoms of hip-joint disease, and the effects of treatment in dissipating the suspicious symptoms so soon as the irritation is subdued in the glands.

(*n*) *Disease of the Knee.*—The pain is not in the joint, but at a spot on its side, where there is no swelling (at least exceedingly seldom) or other sign of disease. The articulation can be freely moved, and the surfaces impinged against one another without suffering, so long as the hip is kept quiet. Then, again, we have the other signs of hip-disease before dwelt on present, which are not here observed.

**Neuralgia of the Hip.**—This affection shows itself in young females, and is hysterical in its character. The pain is not usually localized at such places as we see it in hip-joint disease; but it is more diffuse and more superficial, and is so excessive when the patient's mind is directed to it as to be disproportioned to, and irreconcilable with, the other symptoms. When, on the other hand, the patient's attention is distracted, the pain disappears, and it is not usually aroused by the same manœuvres as in disease of the hip. *Firm* pressure of the articulating surfaces does not augment the pain. The general health is unimpaired unless the catamenia are deranged. The appetite is good and the sleep sound. The hysterical temperament shows itself by other signs—" the facies hysterica," deranged uterine function, or spinal irritation, &c., &c. There are no nocturnal startings of the limb, and under chloroform any stiffness which is observed in the joint disappears, as it is due to voluntary effort. The further recognition of the affection will be facilitated by observing the long continuance of the symptoms without producing any abscess, shortening, or other organic change; the existence of patches of anæsthesia (where the temperature is also lowered) on the limb, and, it may be, in other parts of the body; and the rapid disappearance and recurrence of such diminished sensibility and heat from these parts. From the spine getting distorted by long continuance in one position, the pelvis is twisted, and thus the length of the limb may at first appear altered; but there is no real shortening or lengthening. The hip retains its fulness and contour, and no abscesses form.

**Chronic Rheumatic Arthritis.** See p. 102.

**HYDROCELE.**—*Of the Tunica Vaginalis.*—A collection of serum, simple or encysted, single or double. Sometimes in several communicating or non-communicating chambers.

**Simple Hydrocele.**—The sac, in recent cases, is thin and transparent; in old cases it is frequently thick, and sometimes has calcareous or cartilaginous deposits in its walls, so as to make it opaque and heavy, and thus obscuring the characters of the contents to the hand and eye. The fluid contained in recent hydroceles is clear and translucent; but it may be thick, dark-coloured, and contain cholesterine, in cases of old standing. In quantity, the fluid varies greatly, from a few ounces to gallons in West Indian patients. The testicle, which may or may not be diseased, lies below and behind the serous effusion. Rarely it is found in front or below. If the hydrocele is not tense, the gland can be easily defined; but when the sac is distended, it is sometimes difficult to recognize the position of the testicle, though the firmer feeling communicated to the hand by the gland, and the peculiar sensation experienced by the patient when it is pressed, may enable us to discover its position.

A hydrocele forms slowly, frequently without almost attracting any notice, or causing any uneasiness, till by its bulk, or the discomfort arising from its mechanical effects, it demands attention. It begins below in the scrotum, and "grows" upwards, rarely reaching or invading the inguinal ring. In children it is frequently globular in shape; but in general, a hydrocele assumes a pyriform or oval form, being rounded and broad at its lower end. In rare cases it presents the shape of a pyramid, with the small end downwards; at other times it is hour-glass shaped. It communicates to the hand a soft, smooth, fluctuating feeling, unless it be very tense, when it is elastic and firm. When the sac is very thick, or the fluid contents very consistent, then fluctuation will be wanting. The surface is generally even and the skin natural. The tumour is indolent and painless, only causing a dragging and weight in the loins. The cord can be defined clear above the tumour at its neck and below the ring, unless the cord, too, is affected by hydrocele, or unless, which is very rare, the fluid passes up the inguinal canal into the abdomen. Position produces no change in the size of the tumour. Coughing communicates no impulse. By transmitted light it is translucent, unless from an unusual state of the sac or its contents it loses this character. In children it is peculiarly transparent, so that the position of the testicle is easily defined. By placing the light beyond the tumour in a dark room, and shading the light from the eye by the hand placed over the tumour, and holding the scrotum well out from the patient's body, and stretching the skin by grasping it behind, the transparency can be easily observed. By looking through a stethoscope or any such tube, while the light is held beyond, the translucency is still better determined. The position of the testicle can also at the same time be clearly observed.

When the sac is so thick as to destroy the most characteristic features of a hydrocele (fluctuation, transparency, &c.), yet the history of its formation, there being no expansive impulse on coughing, and no intestinal embarrassment, and the cord being felt clear above, and the ring free, will show that it is not hernia; while a grooved needle will enable its contents to be accurately examined.

In rare cases a herniary sac in young children is transparent; but it is then tympanitic on percussion and light in weight, in place of being dull on percussion and comparatively heavy, and we will have the excentric expansive impulse on coughing, and the reduction with a gurgle on employing the taxis to elucidate further the herniary character of the tumour. On examining such transparent herniæ by transmitted light, opaque lines may be observed, due to the folds of bowel within the sac.

Again, in very exceptional instances, a hydrocele passes up the canal, and has part of its sac within the abdomen, when an impulse on coughing will be very apparent, together with other characters, that, in the absence of any definite history of its formation, might mislead us as to its true nature. Here, however, fluctuation and dulness on percussion can be found, and the fluid can be made, by alternate pressure on the abdominal and scrotal portions of the tumour, to pass from the one to the other; and, lastly, there will be transparency, and no intestinal embarrassment such as exists in hernia. If we can learn the early history of the case, we will further find that it filled up from below, and did not descend, as a hernia does.

Hydrocele is to be distinguished from (*a*) Hernia (see p. 294), (*b*) Sarcocele, (*c*) Hematocele, (*d*) Encephaloid cancer.

It is to be remembered, however, that hydrocele of the tunica vaginalis may be combined with hernia, with sarcocele, or with hydrocele of the cord.

(*b*) *Sarcocele.*—This tumour is harder, heavier, more irregular in shape and surface; has a different history; is neither fluctuant nor transparent; is frequently painful, especially on pressure; and there is no fluid obtained by the exploring needle. It is only those cases of hydrocele in which the sac is much thickened, in which a mistake could be made, and this thickened condition did not exist at the outset of the affection. Add to the above, that in many cases both testicles are affected, and that we have symptoms often elsewhere to denote the character of the sarcocele. In tubercular disease, for example, a similar affection of some other part of the genito-urinary apparatus,—the seminal ducts, prostate, &c., will probably be found; or, if the sarcocele is venereal, we will discover other traces of that affection in the body; or, if cancerous, the characters below noted will indicate the nature of the malady.

(*c*) *Hematocele* is usually the result of violence, and is quickly established. It is opaque, and heavier than hydrocele. The skin is frequently discoloured, if the effusion is outside of the tunica vaginalis.

(*d*) *Encephaloid Disease.*—The round shape, apparent fluctuation, and size of this disease, may resemble hydrocele; but the history of the case; its rapid growth; and elastic, rather than fluctuant, feeling (see p. 26); the state of the general health; the tumour not being of the same consistence throughout, but elastic at some parts, and hard, irregular, and knobby at others (and these can be shown not to be formed of remains of the testicle, by observing the position of these lumps, and the separation of them from one another, and also by the sensation which pressure upon them causes); there being no transparency; the cord, and skin, and glands becoming implicated; the pain which at times marks the progress of the disease;

and, if necessary, the use of the exploring needle—will all clear up the diagnosis.

**Encysted Hydrocele of the Testes.**—May be connected with the epididymis or the testes, and may either consist of a serous effusion into the peritoneal coverings of the cord, or be a new cystic formation. The contents are colourless and limpid, frequently crowded with spermatozoa when the cyst is of the latter character. The tumour is small and tense, single or double, has a smooth outline or is lobed. Fluctuation and transparency are little marked or distinguishable. The testicle is rarely behind; it is usually in front or at the side. This malady is of easy recognition on puncture, as the peculiar nature of the fluid at once points to its character.

**Congenital Hydrocele.**—There is no neck at the ring, but it is prolonged into the canal. Its size and tension are affected by position. It is diminished by recumbency, and augmented by the erect posture and by cough, which communicates to it a faint impulse. It is reducible slowly and with difficulty, by pressure, when the patient is in the recumbent posture.

It is distinguished from hernia by its mode of formation, its fluctuation, and transparency. The slight impulse only on coughing; the different sensation communicated to the hand when it is reduced; and its being returned only slowly and with difficulty; and the absence of gurgle on reduction, all point to its nature. If the finger is kept not too firmly on the ring after reduction, and the erect posture resumed, the hydrocele returns, but the hernia does not.

**ILIAC ABSCESS.**—This usually occurs in females a few days or weeks after parturition, or succeeds puerperal fever or instrumental delivery; but in other cases it occurs in consequence of cold caught during menstruation. In exceptional cases no explanation can be given of its occurrence. It begins, when acute, with shivering, followed by fever, and may cause hectic symptoms and much irritation of the system. It produces a dull aching, and afterwards a throbbing pain in the iliac region. The pain is increased on pressure applied superficially or deeply, according to the place where the matter forms. The pain is frequently so great as to make it impossible to examine the limb satisfactorily without chloroform. Occasionally the progress of the affection is slow and deceptive, giving rise to little or no uneasiness till it attains some magnitude. The patient merely feels out of sorts, and complains of pains in the legs or in the pelvis, and she gets weak and emaciated, with a quick and irritable pulse, and hectic.

Iliac abscess presents itself as an oblong or round swelling of large size in the iliac fossa. It is most common upon the right side. It is immovable and hard at first, and its early detection will depend on the laxity of the parts and the thickness of the parietes lying over it, and the consequent ease with which the surface of the tumour can be reached and examined. When it attains some size, it may be visible to the eye. It may by its pressure on the rectum and bladder impede the function of these viscera, and give rise to bearing down and weight in the bladder, and frequent desire to evacuate both that organ and the rectum. Piles frequently result from the interference with the circulation in the hæmorrhoidal vessels. It may cause diarrhœa and much tenesmus. Sometimes it produces obstinate constipation. The pressure may give rise to œdema of the leg, and this condition may attain to such a size as to simulate phlegmasia dolens. The thigh is kept bent on the pelvis to avoid the pressure.

The tumour may be detected by rectal and vaginal examination. A swelling, painful upon pressure, tense, and hard, is felt (not, however, invariably) in the roof or side of the vagina; the walls of which passage are hot and dry, and all movements communicated to the uterus greatly increase the pain. If the abscess is large, we can perhaps best make out its presence by alternate pressure made with a finger in the vagina and the palm of the other hand on the abdomen. The uterus may be displaced by the tumour. The swelling in time gets soft and fluctuant, and may point at any of the parts where it tends spontaneously to burst.

If the abscess discharges itself spontaneously, the pus may escape by the surface of the body, or into the peritoneum, or into the vagina or uterus, or by the bowel or bladder; or it may pass down by the femoral vessels, and appear upon the thigh of the same side; or it may cross the abdomen, and present above Poupart's ligament of the opposite side; or it may pass out by the sacro-ischiatic notch, and point on the buttock or over the trochanter major.

Iliac abscess has been mistaken for—(*a*) aneurism (when it derives a pulsation from the iliac artery), (*b*) malignant disease, (*c*) morbus coxæ, (*d*) scybalous accumulations in the gut, (*e*) abscess of the abdominal wall, (*f*) sciatica, (*g*) inflammation of the cæcum (typhoid fever), (*h*) peri-uterine hematocele.

(*a*) From *aneurism* it is distinguished occasionally with great difficulty, and only by observing the character of the pulsation; the more rapid progress (usually) of the abscess; the class of persons in which it occurs; the pain which accompanies it; its approach to the surface; the fluctuation, and the non-interference with the distal arteries.

(*b*) From *malignant disease* it is differentiated by the history; the character of the pain; the absence of the peculiar cachexia of cancer, and the more uniform consistence which it presents after a time.

(*c*) From *morbus coxæ* it is distinguished by the age of the patient affected; by the absence of those other symptoms by which hip-joint disease makes itself known, and which are described at p. 313.

(*d*) *Scybalous collections* in the gut, by its shape and larger size, as defined by percussion; by the pain and progress of the affection; by the fluctuation; by not being movable nor capable of being broken down by pressure, as scybalous collections are; and, lastly, by the effects of treatment in evacuating the canal. Masses of feculent matter may cause a tympanitic condition of the abdomen. Colicky pains and vomiting, and the state of the tongue, and the absence of free solid evacuations, will further point to the nature of such accumulations.

(*e*) *Abscess of the abdominal wall* is much more superficial; sooner implicates the skin; and the parts lying over it cannot, as in iliac abscess, in its early stage at least, be rolled over it. It is not attended by such violent symptoms, either general or local; it is not discoverable by vaginal or rectal examination; and does not cause pressure on the rectum or bladder.

(*f*) *Sciatica* can only be confounded with pelvic abscess by the most culpable carelessness in examination, and in the interpretation of the symptoms of either malady.

(*g*) *Cæcal inflammation* shows itself first by intestinal disturbance, succeeded by typhoid symptoms which are characteristic.

(*h*) The tumour in *peri-uterine hematocele* forms more quickly than a pelvic abscess, and is not attended with much febrile disturbance, except it may be just at the outset; but, on the contrary, it is marked by much faintness (if large), weakness, and prostration. It usually extends across the hypogastric region. There may be either an abrupt and profuse discharge of blood at the menstrual period before the appearance of the tumour, or the non-appearance externally of the catamenial flow (which has been hitherto profuse), accompanied by the signs of internal hæmorrhage at the period when the menses should have appeared externally. It is not painful (after it has formed) to pressure—it is elastic but not fluctuant, but behind and below the cervix uteri there is commonly a soft boggy spot.

**INTESTINAL OBSTRUCTION** (Hernia not included).—This may come on slowly, and without much indication of its presence, in persons liable to irregular and defective action of the bowels; or it may be established suddenly. The affection is thus either acute or chronic. Any part of the bowel may be the seat of obstruction; but in the majority of cases it is seated in the lower portion, beyond the cæcum.

When chronic, it is due to malignant disease or a mechanical cause, such as the impaction of hardened fæces, or the lodgment of concretions (biliary or other), or the pressure of a tumour.

When acute, it may arise from many causes, such as simple enteritis; violent spasm; or the passing of one part of the bowel within another ("intussusception"); or the strangulation of the bowel by a band of lymph, stretched from one part of the gut to another, or from one part of the wall to another part of the parietes or to the gut; or by a piece of the bowel getting entangled in a loop of the omentum or mesentery; or an appendix or diverticulum entangling a part of the gut; or to the sudden closure of a diseased portion of the bowel; or to a portion of the bowel becoming twisted on itself, or becoming adherent to some neighbouring organ.

When symptoms set in quickly, they are those of strangulated hernia, as given at p. 298. Constipation suddenly established, attended by stercoraceous vomiting, and quickly followed by vital prostration.

When the affection is chronic, it will be preceded by derangement of the intestinal functions, colic, irregular action of the bowels, prolonged constipation followed by temporary relief, till such time as the obstruction is complete, when the symptoms are those of closure of the passage, followed by abdominal distension, violent vomiting, hiccup, and collapse.

Stercoraceous vomiting is the most certain and characteristic of the signs of obstruction. None of the others by themselves are distinctive—neither the constipation, the pain, the distension, nor the bilious or other vomiting.

The fact of the presence or non-existence of obstruction is more easily determined than the cause giving rise to it. The rapidity of its establishment without previous derangement, will always enable us to draw a broad line between spasm, intussusception, strangulation by a band or loop or diverticulum, or a twist in the bowel, on the one hand, and disease of the gut, the impaction of fæces or other materials, or the pressure of a tumour, on the other.

In any case the abdomen should be carefully examined for a tumour, or irregularity, or place of special tenderness. The rings should be carefully explored. In intussusception a tumour is especially to be sought for in the middle and lower parts of the abdomen. When we have symptoms of obstruction and the presence of an irreducible hernia, it is important for us to decide whether the occlusion is in the protrusion or within the abdomen; and though this is sometimes very difficult, or even impossible to attain, yet we may be pretty confident in regard to it in many cases, if we find that the pain and other symptoms began in the abdomen, and invaded the herniary tumour secondarily; or if, more particularly, these symptoms are confined to the abdomen, and leave the protrusion unaffected. Further, if the hernia remain supple while the belly is hard and distended, and if the aperture through which the protrusion has taken place is free, and the finger can discover no constriction in it, then our diagnosis will be evident. If the movements of the bowel can be observed (as they sometimes can) through the walls, the point at which their motions appear to cease should be noted, and the patient's feelings as to the spot to which enemata penetrate, or the peristaltic action of the gut extends, should be observed.

The rectum must be explored by the finger and bougie, and by the use of large clysters. If the patient be a female, the position and state of the uterus should be examined, in case some displacement or tumour of that organ or of its appendages be the mechanical cause of the occlusion. The history of the case must be carefully considered, and the mode of invasion and progress of the disease inquired into. The state of the urinary secretion must also be determined. If the symptoms are acute, the obstruction will usually be in the lesser gut; while, if chronic, it will probably be in the great intestine, though not by any means necessarily so. The closure of the lower bowel by foreign bodies, scybalæ, piles, tumours of the pelvis, malignant disease, polypi of the gut, dislocation of the uterus, can be easily determined by examination; and in children, when the bowel slips through the ilio-colic valve, the gut may be frequently felt and even seen in the rectum.

The suppression or diminution of the urinary secretion will, in general, point to the small intestine as the seat of obstruction; while, if there be no interference with that function, no great extent of the lesser bowel is likely to be involved. The value of this test is by no means so great as at one time it was supposed to be; yet, if combined with other indications, it is important. If there is great distension of the colon and cæcum, then probably the obstruction is in the great intestine; and the more distended and tympanitic the abdomen becomes, the lower down probably is the point of stoppage. Laugier points out how, in obstruction of the large gut, the distension is great and sets in early, and at first affects the circumference of the abdomen; while, in closure of the lesser bowel, the distension is much less (or, it may be, absent), and that it begins, when present, in the hypogastric and umbilical regions.

In obstruction of the duodenum the abdomen is flat or even sunk.

The free entrance of a large clyster, and the easy passage of a long tube, make it probable (nothing more) that the obstacle is not below the cæcal valve.

If there have been several evacuations after the setting in of other symptoms of obstruction, then the seat of occlusion is probably high in the bowel.

When the vomiting (especially if stercoraceal) is long of appearing, the obstruction is probably low down; while, if it occurs early and is severe, the obstacle is likely to be situated high in the canal. In closure of the duodenum the vomiting is almost constant. The rapidity of its occurrence is inversely as the length of the bowel lying between the obstruction and the stomach.

Pain fixed at one spot, dulness on deep percussion at the same place, and the apparent stoppage of the peristaltic action at that point, will further indicate the probable seat of the obstruction.

If the symptoms of occlusion occur suddenly—possibly after a prolonged attack of diarrhœa, or after a sudden start when at stool—in a child, and are attended by fixed pain in the abdomen and the presence of an elongated tumour, and if there is blood and mucus passed by stool, with much prostration, the affection is probably intussusception. It may be said generally (though the statement is open to much exception) that, when the invagination is seated in the great gut, the tenesmus is greater; the position of the tumour is different, and it is larger and more fixed; it is not attended with so much hæmorrhage, nor such complete obstruction, as when it is a portion of the small intestine which is obstructed.

If the obstruction occurs in persons of more advanced age, and the symptoms of complete closure set in after a long period of irregular action of the bowels, then we have probably to deal with chronic stricture of the gut.

If obstruction occurs at or after middle life, in a person whose health has been for some time giving way—one who has become by degrees thinner and wanner, who has suffered from a fixed pain, irregular bowels (diarrhœa at one time and constipation at another), and ribbon-like fæcal evacuations containing pus and blood—then we have, almost surely, a cancerous affection of the gut present.

If hard and irregular masses, which break down on pressure, are detectable in the great gut, especially in one of the iliac fossæ, then the obstruction is likely due to impacted fæces.

In volvulus, the unequal distension of the abdomen, accompanied by signs of internal strangulation, will be evident.

When gall-stones, large enough to occasion rapid obstruction, find their way into the bowel, it must be by ulceration through the gall-bladder and duodenum, and not by passing down the cystic duct; and then we will have an account of the inflammation and pain in the hypochondriac region which would attend such perforation. It is in the jejunum, or upper part of the small intestine, that gall-stones usually become impacted. Incessant and violent vomiting and much prostration may be also expected in these cases. When the stone passes by the duct, the well-known train of symptoms, including jaundice, which marks that painful process, will be present; and if the calculus is not evacuated by the bowel, it may in time come to cause obstruction, by forming the nucleus of an obstacle sufficiently great to close the bowel.

If the obstruction succeed an inflammatory affection of the abdomen, then it is probably due to a band of adhesive lymph within. If the symptoms follow a sudden exertion, such as jumping, in a previously healthy person, and there be no hernia, the obstruction is probably due to a twist of the gut, and this accident is most apt to occur in the lower portions of the bowel, and to prove rapidly fatal. Obstruction from lymphic adhesions is more common in females than in males—a fact supposed to be explained by the "contingencies of uterine activity."

**JOINTS**.—*See* Arthritis, p. 100.

I. **White Swelling.**—A disease of the joint generally due to scrofula, but occasionally arising from rheumatism and syphilis. It begins usually very insidiously by pain, which augments as the disease becomes developed. The pain is not always in the affected articulation, but may be most complained of at a distance, as at the knee when the hip is diseased. The pain is at first limited and circumscribed, but enlarges its area till it becomes diffused. It is augmented by pressure, and especially by impinging the articulating surfaces together. It is frequently severe at night, and accompanied by startings, especially when suppuration has taken place in the joint.

When the disease begins in the bone, the pain is of a deeper and heavier character than when it is seated in the soft parts. The swelling which accompanies the malady is confined to one part of the joint or invades it all, being however restricted to the neighbourhood of the articulation. It alters the contour of the joint, by effacing its hollows and concealing its articulating processes. When the articulating ends of the bones are first affected, enlargement may precede the entire implication of the joint. The normal movements become more and more embarrassed. The joint is semi-flexed, and while disorganization takes place, abnormal movements are communicable. The swelling from infiltration of the tissues is often very considerable; and as the limb above and below gets emaciated, the articulation becomes very prominent. To the touch, though it is occasionally hard so as to be almost bony, it is more usually elastic and doughy. There may be fluctuation at some spots, but the soft elastic character of the whole articulation is very apt to be mistaken for fluid. The skin is sound unless pierced by sinuses, and it is white, shining, and traversed by blue enlarged veins. The glands above are affected, and abscesses form around and within the joint. When the cartilages are eroded, rough crepitation or rubbing is observed. Spontaneous dislocation may ultimately ensue, and fistulous openings distil pus all round the joint. The general health gives way, and hectic and prostration follow.

The nature of the affection cannot be mistaken, and its cause may be inferred to be scrofulous if the patient is young, and presents other evidences of that diathesis; while, if the disease occurs in the old, and several joints suffer, it is likely to be rheumatic, if it is not evidently due to secondary or tertiary syphilis.

II. **Hydrarthrosis.**—" Hydrops articuli." Dropsy of a joint. This may be acute or chronic. In the former case there will be evident signs of inflammation, and in the latter no such appearances are observed, but a gradual filling of the joint with fluid. The fluid is usually a mixture of synovia and serum, and the articulation is so distended that its shape is altered, its hollows obliterated, and its prominences masked. It is at those parts of the joint where there is least resistance to the pressure from within, and where the cavity of the articulation comes nearest to the surface, that the distension is most marked. If the joint be deeply placed and thickly covered, the peculiar characters referred to may not be observable. In the *ankle*, the swelling is in front and slightly above the malleoli. In the *knee* it is below the patella, and on either side of its ligament, as well as above the joint, under the quadriceps tendon, that the effusion is found. The patella floats on the fluid, so that if the limb is extended and we press down the patella, we can feel it is sustained by the fluid. In the *wrist*, the effusion is observed in front and behind the joint. In the *elbow* it shows itself behind, under the triceps, and upon either side of the olecranon, by which a square look is given to the back of the joint. In the *shoulder* the whole articulation becomes globular, if there is much fluid, or if the quantity is less the distension will be most observable between the deltoid and pectoral muscles.

The skin covering the joint is unchanged in dropsy, and the swelling is soft, fluctuant, and undulating to the hand; not implicating the parts around the joint, but distending the synovial membrane alone. When one hand is placed on the upper or lower part of the joint (which is better than on the sides), so as half to surround it, and the opposite part of the joint is tapped with the finger, the undulations are found to pervade it from side to side, and not to be restricted to limited parts, as in collections of fluid contained in more solid growths within joints. The motions of the articulation are in general little embarrassed, except it may be from the mechanical distension and pressure; but in chronic cases, in which lymph has been poured out, a certain creaking sound may accompany the movements. In very acute cases the articulating surfaces are more or less separated, and the joint fixed in a semi-flexed position by the mechanical effects of the fluid, while a feeling of bursting may be experienced by the patient.

(*a*) In *effusion into bursæ* lying near joints, the articulation itself is free—the swelling is not *in* the joint, but *near* it. It is altogether superficial to the articulation. In the case of the knee, the bursa under the patellar ligament, when enlarged, might be confounded with dropsy of the joint, especially as it may project upon either side of the ligament which binds it down at its centre. Here, however, the patella is in contact with the articulating surfaces of the femur, and is pressed against them by the tension of its ligament, and it is not floated by any fluid effused below it. There has been no inflammatory action in the joint, and the effusion is confined to the head of the tibia, and does not show above the patella. In the effusion into the bursa above the knee, the patella is masked and cannot be felt, yet the outline of the joint is clear below, on either side of the patellar ligament. The swelling usually stands well out prominently above the joint, the movements of the articulation are free, and there is no uneasiness in the joint.

(*b*) In *encephaloid disease* there is a different history. The tumour is larger, firmer, and not fluctuant, except at limited spots. There are usually shooting pains, and frequently there is disturbance of the general health. The superficial veins are usually very prominent. The insertion of a grooved needle will put the nature of the tumour beyond doubt.

(*c*) From *abscess* (chronic) of joints the distinction cannot be made so long as the synovial membrane is entire, unless it be from the cachectic constitutions in which these abscesses appear, the emaciation and general failure of the health, and the accompanying signs of destruction of the joint; but when the pus escapes from the synovial cavity and bursts at various places, when the ligaments and cartilages are destroyed, then there can no longer be any room for confusion.

III. **Chronic Abscess** in scrofulous subjects. There may or may not be evident indications of inflammatory action. Sometimes the pus collects rapidly, sometimes slowly, and without much sign. There may be little or no uneasiness in some cases, while in others the pain is great. The joint is sometimes full of pus before much attention is attracted to it. There may, however, be rigors prior to the collection of the matter, and these followed by hectic symptoms. The signs of distension of the joint are those given above in describing dropsy; but so soon as the synovial membrane has given way, and the cartilages have become eroded, and the ligaments softened and destroyed, then the functions of the articulation are lost, the constitution deeply sympathizes, and the state of affairs within the joint admits of no doubt or perplexity. If there are sinuses the probe will give us intimation, and the sensation of grating and looseness communicated to the hand on passive motion, together with other symptoms of disorganization in the joint, and the painful involuntary startings at night, are very distinctive of the state of matters. Abscesses of the *shoulder-joint* burst behind over the scapula, or in front, near the insertion of the deltoid. Purulent matter escaping from the *elbow* will come to the surface, usually behind, either above or at the side of the olecranon; and that coming from the *knee* escapes either above the patella, and comes out at the lower and inner aspect of the thigh, or appears below the patella, or more rarely behind, burrowing into the calf of the leg. An abscess connected with the *hip-joint* will burst either in the groin between the adductor muscles; on the hip itself, under the fold of the glutei; or it may pass to the inside of the thigh, along the sheath of the psoas and iliacus.

When an abscess lies *near* a joint, but not *within it*, its superficial position will be evident to the hand. It will probably be found to lie over some of the processes entering into the formation of the joint, or be placed to one side; and the pus is not transmittible by pressure from one part of the articulation to another. The general health does not, in such cases, suffer in the same way, and there are no evidences of disorganization of the articulation, no grating on movement, looseness of ligaments, &c., and no involuntary and painful startings in the joint at night.

**LABIA MAJORA,** TUMOURS OF THE

(1) **Sebaceous Cysts.**—Small, indolent, firm, and circumscribed growths, resulting from the closure of some of the gland ducts, placed usually at the lower part of the labium, and having a round or a long oval shape. They may be solitary, but are more frequently multiple. They are slow of forming, and not usually (unless irritated) painful, though sometimes there is considerable discomfort experienced in the part, and that even before the tumour has attained such a size as to render it capable of detection. The skin is unaffected, but over such cysts the small orifice of the closed duct is frequently discoverable. By placing one finger within the vagina and the other outside, or in the rectum, the small tumour is best defined. These cysts are said occasionally to undergo enlargement during the monthly periods.

(2) **Serous and Mucous Cysts.**—The former usually occur at the upper, and the latter at the lower part of the labium. They may attain the size of an egg or more, and may be felt soft and fluctuant; or in consequence of the thickness of their walls, and the greater consistency than usual of their contents, they may be somewhat hard. They are round, or of an elongated oval shape; are not reducible; have no impulse; and not accompanied by any abdominal uneasiness or disturbance; do not alter their relationship by position, and grow with little pain.

Cysts of the labium have been met with of a size sufficiently great to impede delivery, and even small tumours of this nature have been observed to undergo considerable development during the later months of pregnancy.

(3) **Cancer.**—Not common in this part. These growths occur in the old, and their nature is sufficiently apparent by their history, and the peculiar characters presented by the ulceration and progress of the tumour.

(4) **Fibrous and Fibro-cellular Tumours.**—These grow slowly and painlessly, and they may attain a great size. They are firm and solid to the hand, possibly lobed. The skin and mucous membrane covering them is unattached, and not

changed unless by pressure and distension. They are movable, and cause no discomfort, except mechanically.

(5) **Thrombus or Fluid Bloody Tumour.**—This occurs from violence, as during childbirth. A varicose condition of the veins of the part has probably existed previously. The swelling is painful and forms rapidly. It usually presents a livid or violet discoloration. It is firm or fluctuant to the touch, and may, if it is large, cause mechanical retention of urine or fæces. If it bursts, fluid or coagulated blood escapes. Such a tumour may become absorbed or may suppurate.

(6) **Abscess.**—Pain or irritation beforehand. Heat, redness, and swelling. It projects generally at the lower and inner part of the labium, as an oval, soft, fluctuant swelling. It may evert the mucous membrane, so as to appear as if the tumour lay in the orifice of the vagina. There is no impulse on coughing, and the inguinal canal is free. It will burst if left alone, after causing much pain.

(7) **Solid Œdema, Hypertrophy, and Elephantiasis.**—This may occur in many different degrees. It pervades the labium, and does not exist as a circumscribed tumour. The skin is coarse and thick, and the veins are in severe cases greatly enlarged. It is generally confined to one side.

(8) **Nævus.**—Generally venous. It may be cutaneous or sub-cutaneous. It is sometimes pendulous. It generally occurs in the young, and is evidenced by the characters given when describing nævus.

(9) **Hernia.**—See p. 294.

## LARYNX.

**Acute Laryngitis**, in the words of Ryland, "is perhaps the most formidable of the inflammatory diseases to which the human frame is liable." The signs are those of general fever and local inflammation. The symptoms of the general fever require no description; those which are directly due to the local lesion will be briefly enumerated. The early symptoms are attributable to impeded respiration—the later to interference with the arterialization of the blood.

At the outset, this treacherous disease often appears to be nothing but a severe "sore throat." When this is followed by pain, especially excited by pressing the larynx against the spine; by a feeling of constriction in the upper part of the windpipe, and difficulty of swallowing (often an early symptom), anxiety and alarm are occasioned. As the swelling of the lips of the glottis increases the respiration will become more and more impeded, and eventually raucous and stridulous or hissing breathing, together with a drawing downwards of the larynx at each inspiration, marks the more advanced stages of the affection. The voice becomes partially or wholly suppressed, and an irritating cough troubles the patient. The increasing dyspnœa augments the alarm. The features and attitudes of the sufferer graphically portray the terrible struggle which is going on. The prominent eyeballs, expanded nostrils, livid lips, pale leaden face, and labouring chest, are very expressive. In violent paroxysms death makes its onset. The pulse, at one time quick and irritable, becomes feeble and intermitted. The surface becomes cold and bathed in perspiration, and delirium renders, if possible, more terrible the last moments of the poor patient.

The diagnosis is generally easy. The history of the seizure —the adult age—the accompanying fever—the hissing inspiration and free expiration—the cough—the seat of pain—the sound of the voice—the difficult deglutition and the drawing down of the larynx during inspiration. Further, the condition of the epiglottis as revealed to the eye or touch—the absence of disease of the lungs and of general swelling of the neck—and finally the ability to open the mouth widely—will serve to distinguish laryngitis from asthma, phthisis, spasmodic affections, foreign bodies in the air-passages, abscesses external to the windpipe, and tumours at the root of the lungs or in the neck.

**Sub-acute Laryngitis.**—The symptoms are at first referred to the throat and the respiration. There is little pain even upon pressure, and almost no general pyrexia till the later stages, when a low irritative form of fever appears. The dyspnœa, however, soon becomes urgent, even more so than in acute laryngitis, on account of the greater effusion. There is an irritating hawking cough, and a constant endeavour to remove thereby, or by deglutition, some adherent mucus which the patient supposes obstructs the air-tube and is the cause of his uneasiness. The voice gets hoarse or suppressed, and while inspiration is much interfered with, expiration is comparatively easy. Dysphagia is not always present. The epiglottis, though not always swollen, can frequently be felt to be so when the finger is introduced into the throat. When swollen, it has been well likened to a cherry, so round, hard, and red does it become. The glottis, too, can sometimes be felt tense and tumid from infiltration.

When sub-acute laryngitis is a primary affection, it may come on very suddenly; but when it is secondary or consecutive, it may become established much more slowly. Middle-aged persons of a plethoric and weakly habit of body are those most liable to be attacked.

The diagnosis is not usually difficult. The throat affection appearing during or after some asthenic form of inflammation or fever in adults—its being marked by a feeling of obstruction, which the patient vainly tries to overcome by swallowing and hawking—its not being accompanied by pain or acute inflammatory fever—the recognition of the enlarged and tumid epiglottis by the finger, and the increasing obstruction to the respiration, and ultimately the interference with the due arterialization of the blood.

From *true croup* and *spasmodic croup* it is distinguished by the age of the patients affected—by the inspiratory efforts being alone affected—and by the results of digital examination. *Aneurisms* of the great vessels at the root of the neck, giving rise to somewhat similar laryngeal symptoms, may be recognized by careful auscultation, and the signs of pressure on surrounding parts which such tumours occasion.

**Chronic Laryngitis** is the most common of all the forms of laryngeal affection, and may vary in severity from an illness so slight as hardly to attract attention, to one of the most severe and formidable nature.

Chronic laryngitis may result from neglected catarrh, or be the sequel of acute inflammation. It is however most commonly seen as the effect of some frequently renewed irritation, as oft renewed colds—frequent exposure to sudden alternations of temperature—injuries of the throat—repeated over-exertions of the voice—the inhalation of irritating dust or gases.

Intemperance, scrofula, the abuse of mercury, debilitating diseases, and derangements of the digestive organs, strongly predispose to it, and it is a frequent accompaniment of tubercular disease of the lungs and of syphilis. The symptoms of chronic laryngitis vary much with the severity of the seizure and the extent of surface implicated. Its presence may be alone signified, in the slighter forms of the affection, by a husky and hoarse voice, a dry wheezy cough, and some amount of dyspnœa. Pain on pressing the larynx against the spine, or on moving it from side to side, will also probably be felt.

The more changed from its normal condition the mucous membrane becomes, the more will the calibre of the larynx be restricted, and the breathing and voice suffer embarrassment. The inspiration becomes sibilant in the more severe forms of the disease, and complete aphonia may exist. Deglutition is occasionally interfered with, especially when ulceration is present on the anterior surface of the epiglottis. The disease may extend downwards and implicate the lungs, giving rise to tubercular deposit there. Such implication is not easily determined, because of the confusion of sounds heard through the stethoscope, but by percussion the existence of tubercular matter may be recognized.

The diagnosis will rest on the history of the attack—the changed, hoarse, whistling voice—the hissing inspiration—the peculiar cough—the tenderness produced by pressure on the upper part of the windpipe—the pain or uneasiness caused by deglutition and by speaking—the absence of acute inflammatory fever, but the presence of considerable constitutional irritation or hectic. When there is ulceration at the upper orifice of the larynx (as on the epiglottis), then the pain on deglutition will be very considerably augmented, and at all times there is a fixed pain at the upper part of the larynx, and usually a rejection of fluids by the nose. When ulceration attacks the vocal cords, the voice will be hoarse or suppressed.

The differentiation of chronic laryngitis, and *aneurismal* and *other tumours* pressing on the recurrent nerve, is to be sought by the effects which their pressure will occasion on blood-vessels, gullet, or lung—by auscultation and percussion of the upper part of the chest giving evidence of the aneurism (if it be such a tumour), or showing the presence of some growth which occupies the place where lung should be.

In few cases can any confusion exist between chronic laryngitis and an attack of *asthma*, but the state of the voice will serve as a well-marked distinction. In asthma it is little if at all changed; in laryngitis it is very markedly affected. Further, the paroxysm of asthma comes on for the most part suddenly, and leaves the patient, as it found him, in comparative health; while the other affection becomes established slowly, and increases in intensity, remaining long, and leaving the person affected in a deplorable condition. There is, besides, the previous occurrence, probably, of the asthmatic attack, and there is its recurrence, all serving to distinguish the two diseases beyond the possibility of confusion.

**Nervous affections of the Larynx.**—Spasm of the glottis may occur either in the adult or in the child, and frequently occasions very serious results. In the adult such an affection is generally connected with hysteria, but it may arise from pressure caused by various tumours on the inferior laryngeal nerves. Bronchocele, cancerous and scrofulous tumours of the neck, and aneurism of the great vessels, may thus act. Spasmodic affections of the glottis, too, may result from irritation of neighbouring or distant parts, as inflammation of the œsophagus or bronchi, or even of the soft parts around; irritation of the nerve-centres or of the digestive or uterine organs, &c. Thus the source of irritation may be both distant and obscure.

In children spasmodic affections of the glottis are often very serious. Such an affection is variously designated "Spasmodic" or "false croup," "Laryngismus stridulus," "Thymic asthma," "Crowing disease," &c. &c.

Those affected are usually below four years of age, and are attacked for the most part suddenly on awaking from sleep with dyspnœa so severe as to threaten instant death. This ends in a crowing noisy inspiration as recovery takes place. Sometimes we have no difficulty in discovering the cause of the seizure, but at other times there is nothing to guide us. Some unusual bodily or mental irritation is the common cause. An irritation in the gums, in the digestive organs, or in the brain—fear, or sudden impressions of any vivid kind, may also occasion it. Weakly children, as those recovering from some depressing complaint, are those most liable to be attacked. Some authors have ascribed the malady universally to disease of the brain; others to the thymus gland, or enlarged scrofulous glands, at the root of the neck, pressing on the recurrents, or the veins, and thus causing a direct effect on the glottis; or congestion, and it may be effusion on the brain. However, we well know that spasmodic croup does not always recognize such serious causes as these, but may be due to temporary influences which leave no permanent evil behind.

The attack of spasm may pass off as suddenly as it came, and may not return; but most usually it recurs at irregular intervals, if the cause continues in activity, and it may even end in general convulsions. It is apt to be mistaken for *foreign bodies* in the air-passages. The absence of fever and premonitory symptoms, its suddenness, its irregular intermittent character, all make it resemble cases of foreign bodies in the windpipe; but there are other points in which they manifestly differ.

The symptoms which have been above referred to, taken in connection with the child's age, the absence of any catarrhal symptoms, the freedom of breathing between the attacks, and the presence of some efficient cause, will clearly define the nature of the affection.

**Morbid Growths of the Larynx.**—Hydatids, cartilaginous tumours, warts, and venereal papules, are occasionally developed in the larynx. Polypous growths, or growths simulating polypi in shape, are also met with. These last occur most frequently in young male subjects, and are invested with considerable interest. They may be either of the mucous or fibrous description, and vary much in size and shape. They may be round or lobulated, single or in clusters. Occasionally medullary cancer is found in the larynx, assuming shapes similar to that of polypous growths. Laryngeal polypi, though sometimes attached by broad bases, are most frequently seen with narrow and long stems. The mucous polypus consists of an hypertrophy of the mucous membrane; while the fibrous springs from the sub-mucous tissue, and either ruptures the overlying membrane, or carries a layer of it on its surface.

Laryngeal polypi cause danger, by the mechanical obstruction they occasion in the windpipe; and this they the more readily accomplish from their most common site being the neighbourhood of the glottis. They also occur on the vocal cords, in the ventricles of the larynx, and at the root of the epiglottis. When present in the larynx, polypi cause embarrassment to the respiration, a change in the tone of the voice and in the sound of the breathing, and sometimes they give rise to much more serious effects by changing their position suddenly (when loosely attached), and closing the chink of the glottis. Suffocation will follow such an accident if the efforts of the patient fail to remove the impediment. If he is successful in freeing the orifice, the original state of the respiration is at once restored. The movements of these tumours within the larynx are occasionally perceived by the patient, and their presence can sometimes be demonstrated by means of the laryngoscope, when the patient is placed in a good light, the tongue well depressed, and a forced expiration made. In such cases the tumour may sometimes be seen for a moment to project by the side of the epiglottis. Roux and others have, moreover, succeeded in exploring these tumours with the finger. These methods of diagnosis may be put into requisition in any suspected case; and if portions of the growth are expectorated, as they sometimes are, then there can be no doubt as to the nature of the obstruction.

It may be added that some patients affected with laryngeal polypus have, by making rapid efforts of inspiration and expiration, produced a valve-like sound; and a hoarse cough and a sibilant inspiration are not uncommon accompaniments of the malady. The symptoms occasioned by the growth will vary with its site. Polypi are not, however, always easily recognized or distinguished from other affections in which there is obstruction to the respiration. Sometimes they grow very insidiously, and death takes place without the true ailment having been discovered.

*Warty, cauliflower-like excrescences*, similar to those so often seen on the vulva, occur in the larynx, and are of venereal origin. They give rise to obstruction, but have no other distinctive sign.

### LIPS, TUMOURS OF THE.

(1) **Erectile Tumours.**—May be placed on the external or internal surface of the lip, or may pervade its whole thickness so as to appear upon both surfaces. They are recognized by the characters given afterwards. (*See* TUMOURS.)

(2) **Epithelial Cancer.**—It is on the lower lip that it is almost invariably placed. It chiefly occurs in males who have reached or passed middle life. It begins as a fissure or a crack which has been prevented from healing by constant irritation; or as a small wart; or as a small pea-like tumour set deeply in the substance of the lip. The irritation caused by using a short clay pipe or oily tobacco, or the constant friction of a sharp tooth, causes what was at first without malignancy to take on a cancerous action. The disease may present itself either as a crop of elongated, coarse, giant papillæ, generally of a dark gray colour, making the lip to project somewhat; or the papillæ are close set together, and from between them a thin discharge exudes; or a scab is formed around and between by the discharge and scales getting matted together. There is a certain hardness or firmness in the base of the growth, and it may be very painful to the touch. Further, epithelial disease of the lip presents itself occasionally as a somewhat pendulous mass, having a narrow stem, and a coarse, deeply fissured, granular surface. Sometimes, again, the disease occurs as a rough surface covered with epidermic scales, which form constantly renewed crops. It dips little into the substance of the lip, but spreads out more along its surface. When the disease has ulcerated, the sore is an excavated, dirty, irregular one, having a coarsely granulated surface, giving out a fœtid discharge, and having hard elevated edges and dark thick scab. The sub-maxillary glands become affected, and so the disease progresses.

(3) **Cysts.**—These probably form from a dilated gland duct, and they contain a glairy fluid. They lie loosely in the tissues near the mucous surface. They are small and rolling. They may lie deeply, or project sufficiently to show their transparency. Occasionally a small opening is observed at their summit, from which the contents exude. If inflamed, they become very painful; but if not inflamed, they cause little if any annoyance. If they ulcerate, a small, deep, cup-like sore forms, which may be mistaken for a chancre or cancer.

(4) **Glandular Tumours.**—These tumours grow slowly. They are indolent and deep-set. They are round, and project in front, and are flattened behind. They cause deformity by their bulk, and they are firm and elastic to the touch. They have occasionally bony masses in their substance. The overlying tissues are healthy.

**LYMPHATICS**, Inflammation of.—"Angeioleucitis." Usually acute.

*Constitutional Symptoms.*—May precede or accompany the local affection. These symptoms may be little or not at all apparent, or they may be very violent. They are inflammatory fever setting in with chilliness or rigors, and afterwards running into a typhoid type, with probably indications of purulent infection.

*Local Symptoms.*—When inflammation attacks the superficial lymphatic vessels, a number of delicate red lines may be seen leading from the wound (if one is present) up the limb towards the lymphatic glands. These lines may not commence at the wound, but a considerable interval of unchanged surface may intervene between it and the vessels first affected. The inflamed lymphatics are at first distinct from one another, crossing and interlacing, and presenting slight enlargements at the points where they join; ultimately, however, these lines unite, so as to form broad bands of varying size, which, though somewhat tortuous in their course, yet follow the axis of the limb. Along the course of the vessels, and at intervals on the surface of the limb, patches of erysipelas or erythema occur, and appear as if they communicated by means of the bands referred to. These patches may join, so that the whole surface of the limb becomes red. There is usually more or less œdematous swelling; and the glands to which the lymphatic vessels lead become early painful, enlarged, hard, and inflamed. The malady ends in resolution, suppuration (in circumscribed patches or diffused), or induration.

When the deep vessels are alone affected, pain, deep, lancinating, and violent, at fixed points or throughout the part, is the leading sign. There is hard, brawny swelling of the limb generally, and an enlargement of the deep glands. These, from being of considerable size, can usually be felt. The disease commonly comes to implicate the superficial vessels and glands as well as the deep ones, and the skin may be white and porky, or dusky red.

Angeioleucitis may be confounded with *phlebitis*, with which it is occasionally combined; but the more rare implication of the glands in phlebitis ; the red lines in that malady being larger, less numerous, more distinct and prominent, easier felt, more knotted, less tortuous, and not leading to the lymphatic glands—will distinguish them when the superficial vessels are affected. If the disease is in the deep lymphatics, the distinction is impossible.

From *simple erysipelas* (they are often combined, however) we have the red lines and cord-like feeling along the vessels, the gland affection more constant, and the redness in patches, to guide us. Erysipelas is more uniform, spreads from a centre over the part, and its limits are well marked.

*Erythema nodosum* is preceded by symptoms like the exanthemata, which disappear as the eruption comes out. It occurs in elevated, hard, scattered, oval patches on the surface of the limb ; is of a bright red colour at first, becoming afterwards livid like a contusion. There are no red lines. It is rapidly developed. There is little or no gland affection, and there is desquamation of the epidermis as the disease leaves.

In *phlegmon* the pain and swelling are more circumscribed and decided, and there are no red lines, as in angeioleucitis.

**MAMMA,** TUMOURS OF THE.

A. **Abscess.**—Acute and chronic.

(*a*) *Acute.*—May be caused by violence, but is most common during lactation, and appears shortly after the establishment of that function, in consequence of the inflammation of one or more of the lobules of the gland; or it may appear late, from too prolonged use and consequent irritation of the breast.

Acute abscess of the mamma may be seated either (1) superficially to the gland in the sub-cutaneous tissue; or (2) in the substance of the gland; or (3) behind, between it and the parietes of the chest. The superficial form of abscess generally appears near the nipple, and is not unfrequent at puberty. It occurs equally in single and married females, and is of easy recognition. It is during the course of lactation that the intra-mammary and post-mammary forms are met with. They all set in with the usual signs of inflammation.

Abscess may begin with a rigor; or a shivering may only occur when the pus forms, and after the usual signs of inflammation have been present for some time. Both breasts are equally liable to abscess, and the lower lobes more than the upper.

(*a*) *Acute abscess* is recognized by the pre-existence of the inflammation and the swelling of the breast—its becoming red, tense, heavy, glazed, shining, and œdematous. It is very painful, especially to the touch. The pain becomes throbbing. Fluctuation will be observed early if the pus is near the surface; but if it lies deeply, and the collection is small, it is peculiarly difficult to make out. Fluctuation is best discovered by grasping the gland, so as to tighten the skin and render it prominent with one hand, while we palpate with the other (see page 25). When the abscess is superficially placed, it gives rise to the ordinary signs of circumscribed abscess; when again it is seated in the gland substance, implicating one or more lobules or the whole gland, the pain and constitutional disturbance will be more severe than in the sub-cutaneous form. When within the substance of the breast we may meet with a succession of abscesses, as different lobes become affected, and the milk which escapes from the nipple may be mixed with pus, and the pus which appears when the abscess is opened is mixed with milk. When again the abscess forms behind the gland in the plane of cellular tissue, the pain is great, heavy, deep, and tensive, and is augmented by all movements of the arm. The accompanying fever is usually violent. The gland is somewhat projected from the parietes of the chest, and it appears as if fixed. There are no indications of inflammation in the gland substance itself, unless it too is involved, which it by no means always is. The act of pressing the mamma backwards against the chest gives to the hand a feeling as if a sponge was pressed upon, and when this is done, the pain is much increased, and fluctuation (if the quantity of pus formed be considerable) can be felt at some part of the circumference of the gland, where the pus tends to burst and leave fistulous openings.

These abscesses behind the breast may be due to some affection of the bones or other structures of the chest-wall, or to disease within the thoracic cavity, or simply to lowered vigour.

To distinguish mere engorgement of the mamma with milk from abscess at its outset, is in many cases impossible, but if the swelling and pain follow closely on the birth of the child; if the flow of milk has been scanty, or the breasts have not been used, the chances are that we have to deal with engorgement from the retention of milk; and this opinion will be confirmed if the skin remain unchanged in colour, aud the fever disappear in twenty-four hours.

(*b*) *Chronic abscess.*—Most apt to occur after the uterus has been active, whether a mature child has been born, or an abortion or miscarriage has taken place; but it may also in rarer cases appear in young and unmarried females. It is apt to occur in a breast which, for some cause, has not been used after child-birth. There may be little or no sign of inflammatory action preceding the appearance of the tumour, which may form without any apparent cause. There may be from the first only one lump in the breast, or there may be several, which, though distinct at first, come ultimately to coalesce.

A chronic abscess is usually a deep-seated tumour, placed most commonly at the base or in the depths of the gland. It is usually about the size of a hen's egg, and has a regular surface, is painless, and does not cause annoyance, except by its weight and position. It is not clearly defined in its outline, and not easily moved in the tissues. It increases very slowly, and without attracting much if any attention. The skin over it is unaffected. There are no enlarged glands in the axilla, as a rule; though, from irritation, or as a mere coincidence, these glands may become enlarged. The rest of the mamma is healthy. The nipple is very seldom affected, and it is never so retracted as it is in scirrhus. There is nearly always œdematous swelling below and to the outer side of the breast. Fluctuation is very difficult to distinguish, as the cyst wall is often thick from lymphic deposition, so that the tumour feels solid. On careful examination, elasticity may generally be discovered at some part of the tumour. The exploring needle will determine the state of things in doubtful cases. The general health is unaffected.

Chronic abscess, then, is distinguishable from solid tumours by the following features:—

(1) Its occurring after some uterine derangement, some miscarriage, or abortion, or simple functional disturbance.
(2) Its formation not being attended with pain or inflammatory symptoms.
(3) Its smooth ill circumscribed feeling, and the rest of the gland being apparently healthy.
(4) Though firm and hard, yet elasticity being found by careful examination at some part of its surface, which spot is often more tender to the touch than the rest.
(5) There being seldom any affection of the lymphatic glands, unless slight from irritation, and then they are not hard and bound to the underlying tissues.
(6) There being usually œdema of the sub-cutaneous cellular tissue below or to the outer side of the gland.
(7) The results of puncture.

If, after opening an abscess of the mamma, the pus which escapes after the interval of a few days becomes sanguinolent, we may be certain that another abscess exists, more deeply placed than the first, and in close relationship to it.

**B. Neuralgia of the Mamma.**—"Irritable mamma."

This affection occurs most commonly in unmarried females whose menstrual functions are deranged or deficient, or who have disease of the uterus. Occasionally it is met with in middle-aged "nervous" females. It may affect the whole gland or only a portion of it. There is usually no change discoverable by the hand or eye in the condition of the gland; but at other times the mamma is more dense than normal, and may even become enlarged, firmer, and heavier than usual. Pain is the leading feature in the case, and it is excessive, is superficially seated, and aroused by slight causes, and sometimes by no apparent cause whatever. It flashes like an electric dart through the breast, sometimes passing to the shoulder and down the arm, to the head and neck, and to the groin and spine. There are commonly remissions in its attacks; and while it partially subsides or even disappears during the flow of the menses, it is generally much augmented just before their appearance. It may pass from one breast to the other. The stomach is occasionally very irritable, and the vomiting may be distressing; yet the general health remains good. Sensations of excessive heat and cold occurring alternately in the breast constitute more rarely the evidence of the perverted sensibility present.

Our recognition of this condition, when there is any hardness in the breast, depends on observing the following points:—

(1) The age, history, appearance, and disposition of the patient.

(2) The general health being good, and there being no cachexia.

(3) The superficial darting and excessive character of the pain. Its exacerbation before the monthly periods, and diminution during menstruation.

(4) The breast little if at all changed, when examined under chloroform.

(5) There being no affection of the glands in the axilla.

(6) There being some explanation, probably, of the condition of the breast in the state of the uterus.

(7) If it pass from one breast to the other, then a great additional aid is obtained.

**C. Cysts.** (*a*) *Simple.*—May be formed either by an obstructed milk duct, or by the enlargement and coalescence of the cells of the cellular tissues, or by the formation of a cyst from an original germ. They may be unilocular or multilocular—the former being commonly placed at the anterior surface or border, and the latter deeply in the substance of or behind the gland.

Those cysts which are formed of milk, changed or unchanged, occasionally attain a very great size. Serous contents may assume many different degrees of consistence and various colours.

(*b*) *Proliferous or compound cysts* also occur in the mamma, and these are occasionally of rapid growth, so that the fluid is expelled, and the tumour becomes a solid one—the chronic mammary tumour being probably in some cases formed in this way. As these cysts grow, the physical characters of a cyst and a solid tumour will be variously combined.

In old simple cysts, the walls may become thick and calcareous, and the contents so glairy and dense that the usual soft fluctuant feeling of a cyst is lost.

Cysts form slowly and steadily, as a rule. Sometimes, after growing slowly for a considerable period, they undergo a rapid increase, and this augmentation may coincide with the cessation of the menses. Cysts containing hydatids sometimes increase rapidly, and, it may be, suddenly, and, except those containing milk, seldom attain a great size. To this rule, however, there are every now and then remarkable exceptions. Cysts are generally indolent, causing only mechanical annoyance. They have a smooth surface, are movable and circumscribed; they fluctuate if near the surface, and are not very tense nor their wall very thick; and even when deep, by careful examination, elasticity may be discovered. They are not accompanied by any enlargement of the lymphatic glands. The skin over them (unless the tumour is superficial and causing much pressure, in which case the bluish colour of the cyst may be apparent) is unaffected, and the general health not contaminated. If large, prominent, and having thin walls and clear contents, mammary cysts may be transparent. If they are formed by a dilated milk duct, they will appear during or shortly after lactation; and if hydatid, they will in general be multiple, grow quickly, be hard and solid to the touch, or soft at some parts and hard at others. If large and near the surface, a peculiar fremitus, produced by movements communicated to the contained acephalocysts, may be perceived on percussion. It is only, however, by obtaining some of the contents that the certain recognition of these hydatid cysts can be made. The exploring needle in any case may be had recourse to, if other means of diagnosis fail.

The leading features, then, of mammary cysts are—

(1) Smooth outline and usually slow growth.

(2) Indolent, movable, and circumscribed.

(3) Fluctuation, if favourably placed for applying such a test; and if this be present, it is the most characteristic sign of all. Fluctuation is not observed till after some time, however. Elasticity may be obtained, even though no distinct fluctuation can be perceived.

(4) No enlargement of the glands or affection of the general health.

(5) Skin unaffected.

(6) Information obtained by the exploring needle.

D. **Hypertrophy.**—An increase of volume due to an excess of development of the gland tissue, and not to the deposit of any abnormal product in its substance. It may occur in either sex, but is, of course, in a great measure confined to the female. It may arise during pregnancy, or may apparently depend on inactivity of the uterus, as when the catamenia are deficient or suppressed. It usually affects both glands, but one (and that usually the left) more than the other. Generally it is slowly established; it rarely grows rapidly. It may attain a great size, and so influence the general health as to cause emaciation and great weakness. It is painless even on pressure; but the mechanical effects on the chest and body may be very annoying or even disastrous. The lower surface of the breast may be œdematous. To the hand it is firm, even, occasionally nodular, and sometimes, though seldom, tender, and the veins on the surface may be dilated. The lymphatic glands are not affected unless there has been some irritation present beyond the mere hypertrophy. The gland structure is sometimes retained intact in these enlargements; sometimes it is considerably altered. There are no signs of inflammation present.

If uncomplicated, this affection cannot be confounded with any other. The gradual and great enlargement of both mammæ throughout their whole substance is quite distinctive.

**E. Chronic Mammary Tumour.**—"Mammary glandular tumour." Occurs most frequently in unmarried females whose catamenial functions are deranged. It is most common between the ages of twenty and forty; frequently it occurs before thirty. It is occasionally met with in barren married women. It may apparently be caused by injury, and attention is attracted to it frequently by mere accident. It is usually confined to one breast, and may form in any part of the gland; but it is most common near the upper and inner part and close to the surface. It may be placed on, in, or below the gland, the last position being the rarest. It varies much in size. It grows slowly in general, though occasionally it has been seen to increase rapidly. Sometimes, after attaining a certain bulk, it remains stationary, and may even disappear spontaneously. It is round or oval, and lobular to the hand, and is firm, incompressible, and elastic. It has not the stony hardness nor the weight of scirrhus. It is very movable, and when small feels almost as if floating in the tissues. It is circumscribed, and in general painless; though occasionally these tumours have been known to be very painful—the pain not, however, being of a lancinating character. There is no affection of the glands (unless by irritation), and the skin is sound. There is no tendency to ulceration nor adhesion, nor discoloration of the skin, unless the pressure on the surface is great. In rare cases when an adenoid tumour undergoes a great development, and comes to burst through the overlying parts, the protrusion is of a gray color, is elastic, and does not bleed violently, like soft cancer under like circumstances. Enlargement of the superficial veins may occasionally be observed. At the menstrual periods, tension and uneasiness are complained of. The general health is unimpaired. The patient is generally in robust health. This tumour has no deep connections binding it down to the gland, and the nipple is seldom (though occasionally) affected. The unoccupied part of the gland is healthy, though it may be greatly diminished by pressure when the tumour is large. When removed, the glandular tumour is found to be a capsulated, irregular, lobed mass, presenting a gray section, and an ultimate stricture, more or less closely resembling the gland substance, whose natural elements have undergone greater or less alteration.

The leading characters, then, of the chronic mammary tumour, when uncomplicated, are—

(1) Its occurrence in barren or unmarried females with deranged menstruation, between twenty and forty years of age.

(2) Its slow and painless growth.

(3) Its irregular outline, and firm, elastic feeling.

(4) Its being movable and circumscribed.

(5) The skin being unaffected and the general health uncontaminated.

(6) There being no lymphatic affection and the nipple not being retracted.

(7) The rest of the gland being only mechanically incommoded.

A. **Hard Cancer**, as it appears in the mamma, is commonly taken as a type of the disease in general. It is most common in barren women between forty and sixty years of age, and just after the catamenia have ceased. Its precise outset is seldom known. It is generally discovered by chance, and is attributed often to a blow or other injury. It may occur at any part of the gland; but it is least frequently met with at its inner aspect. It may occupy the whole gland, or only a part of it. It may be combined with cystic growths, or a chronic mammary tumour. It is said to occur most commonly in the left breast. The tumour is at first small, and it may long continue so. It is of stony hardness, heavy, and inelastic, like an inorganic mass. Its surface is irregular and knotty. It is firmly set in the tissues; and from the adhesion which it soon contracts on all sides, it moves the gland along with it when pushed aside. It is not usually well circumscribed, but shades off into the surrounding tissues. It is commonly painless at first; but afterwards, in general, becomes the seat of burning, lancinating pains, which shoot into the axilla and down the arm. The upper extremity, upon the side on which the growth is placed, is sometimes œdematous and swollen, as may be also the whole side of the thorax. The tumour in general grows slowly. In old persons it may increase very slowly; and the more slowly, the more markedly will the distinctive characters of the cancer be. In acute cases, the characteristic features of the tumour are a good deal lost. A cancerous tumour of the mamma has deep connections which bind it to the gland, and prevent it sliding on the underlying tissues. The skin is puckered and dimpled, and adherent if the tumour is near the surface. There may be bands connecting the integuments with the surface of the tumour, even though it is not placed near the surface. If there is adhesion between the skin and the surface of the tumour, the former may be discoloured. The nipple is retracted and sunk. The superficial veins are enlarged if the tumour is of great size. The glands in the axilla, and sometimes also those under and above the clavicle, and more rarely those which accompany the internal mammary, are enlarged, hard, and adherent. The lymphatic vessels along the edge of the pectoralis will also be indurated and painful, if the case is at all acute. Occasionally the glands are enlarged almost from the outset; in other cases they are not affected till ulceration begins. The general health gives way; emaciation, derangement of the digestive organs, and the peculiar sallow cachexia indicative of cancer, will appear.

A mamma affected by scirrhus may be atrophied, or the space left by the shrinking gland may be occupied by fat, and so the actual size of the gland to the eye be retained or even augmented.

The appearance in section of scirrhus will be referred to afterwards, when speaking of the diagnosis of the disease in general. (*See* TUMOURS.)

In some cases, many of the characters above enumerated may be much changed. The hardness may not be so marked, or the great specific gravity so apparent, and occasionally there is little or no pain from first to last.

When ulceration has begun, the sore is characteristic. It begins on the surface, and passes inwards. It is circular, punched out, with elevated, everted, hard, cancerous edges. It is irregular, deep, and angry-looking, with a dirty surface, and a fœtid, offensive, ichorous discharge.

Sometimes the disease is developed in the nipple and skin; the former gets hard, rigid, and inflexible, and the latter thick, brawny, coarse, fixed, and dark-coloured, and has hard, bluish knots or ridges in it, which dip deep into the gland, and can be felt on palpation. The whole side of the chest may become fixed, as if in a cuirass, by the disease developed in the skin. ("Hide-bound.")

B. **Encephaloid, or Soft Cancer.**—This form of disease in the mamma is much rarer, at least in this country, than hard cancer, and its characters and progress are seldom so regular and distinctive as are those of scirrhus. It may be developed close to, but not in the gland; or it may lie deep in its substance as a round, nodular, or flattish tumour, usually of rapid growth, and occasionally attaining a great size. The consistency of such a growth varies at different parts of its surface; being soft and elastic at some, and firm at others. It is not hard and heavy, but buoyant and light when poised on the finger. The veins on the surface are much enlarged, and the whole mamma is often projected and prominent. The tumour is not at first closely knit to the gland; but in time becomes so, fixing it to the part below. The skin is not adherent in the same way as it is in scirrhus, but it gets thin and stretched as the growth comes to press upon it; finally, it becomes livid and bursts; giving exit to a fungous mass, which discharges blood and very offensive matter. The constitutional cachexia is usually greatly more marked than in scirrhous disease, but the lymphatic vessels and glands are often not involved till late in the disease. The amount of pain suffered varies much in different cases, but is often not great at any period of the history of the tumour. The nipple is not so sunk as it is in scirrhus, and occasionally it is not retracted at all. Various kinds of cysts may be connected with an encephaloid tumour of the breast.

*Melanotic cancer* is very rare in the mamma, and never occurs in it alone.

*Epithelial cancer* is exceedingly rare in this region.

The *calcareous*, *osseous*, *tubercular*, *cartilaginous*, *fatty*, *and fibrous masses* which form in the mamma, are of such very rare occurrence as not to render it necessary to dwell on their characters here.

The most usual and important morbid growths which occur in the mamma are then (setting hypertrophy aside as of easy recognition)—abscess (acute and chronic), cysts, and chronic mammary tumours on the one side, and cancer on the other.

The characters of abscess, cysts, and chronic glandular tumours have been sufficiently dwelt on; but the broad lines of distinction between scirrhus and non-malignant solid growths (a distinction frequently called for in practice) may be epitomized as follows. It may, however, be here premised, that in examining the breast in any case, we should always render it as prominent as possible with one hand, while the other presses it from before backward, and not from side to side; as in this way the error would not arise from the lobules being compressed, and thus giving the idea of a greater amount of consistence being present than really exists. It may be well, however, in doubtful cases to examine the gland in both ways.

The distinction between many of the tumours above noted is most difficult when they are small, notwithstanding such broad lines of contrast as can be recognized in typical examples of either class when they have made some progress; and cases every now and then present themselves in which it is impossible to do more than surmise with more or less probability the true character of the growth present.

The conjunction in the breast of a simple and a malignant growth; the succession of a malignant to a non-malignant tumour formerly present; the undefined characters of the tumour when presented to our examination; the obscurity connected with the history of the growth; and many circumstances in the individual history of the patient—may tend to render the diagnosis especially difficult.

From the extreme rarity of soft cancer, we may for practical purposes leave it out of account; as the question which is, in the vast majority of cases, presented to us in practice is, whether the tumour is hard cancer or a benign growth.

The following points are to be observed in drawing a distinction between scirrhous tumours and simple solid growths.

(1) The personal and family history may throw much light on the nature of the growth, as showing a hereditary tendency to cancer.

(2) Age and uterine state.

| | **Scirrhus.** | **Innocent.** |
|---|---|---|
| 3. *Outline.* | Irregular, knotty, and not clearly defined at its circumference, unless the mamma is atrophied. | Irregular or lobed, circumscribed. |
| 4. *Consistence.* | Hard, stony, incompressible. | More elastic, and less like an inorganic body. |
| 5. *Weight.* | Very heavy. | By no means so weighty. |
| 6. *Mobility.* | If of some standing, it is fixed, has deep adhesions, as can be shown by lateral movements and drawing the gland out from the chest; when moved, the gland is moved along with it. | Movable, sometimes almost floating. Moves *in* the gland. |
| (7.) *Size of the rest of the Mamma.* | Frequently diminished. Occasionally disappears; more rarely augments, by deposit of fat around the contracted gland. The new growth smaller than the gland it replaces. | General size of the gland not affected or if it is, it is augmented in proportion to the new growth formed, the gland being pushed aside (more rarely it is partially absorbed by the pressure), but remaining. |
| (8) *Skin* | Adherent when the tumour comes near the surface. Gets changed, hardened, discoloured, drawn in, puckered, and may present hard knots in its substance. | Not affected, unless merely stretched and thinned. |

### (9) *Nipple.*

| | |
|---|---|
| Retracted usually into a pit, if the tumour lies near it. | Very rarely retracted, and if so, not so markedly. |

### (10) *Lymphatic Glands.*

#### (*a*) *In the axilla and vessels leading thereto.*

| | |
|---|---|
| Implicated more or less. Hardened, enlarged, and fixed, and the vessels early affected. | Seldom influenced, and if so late when generally the nature of the growths causing it can no longer be mistaken, and it may be from irritation. They are never hardened and fixed in the same way as in scirrhus. |

#### (*b*) *Glands below and above the clavicle.*

| | |
|---|---|
| Often hard and enlarged. | Not affected. |

### (11) *Pain.*

| | |
|---|---|
| Frequently slight at first, but afterwards generally lancinating and severe. Burning. Usually remitting. | Frequently absent, and if present not usually so severe, or of the same character as in cancer. Generally continuous. |

### (12) *Veins on the surface.*

| | |
|---|---|
| Generally prominent and enlarged. | Little if at all affected usually. |

### (13) *Speed of growth.*

| | |
|---|---|
| While it is true that in the old, hard cancer may long remain stationary, yet in younger patients, and in the majority of cases, it increases rapidly. | Many of the innocent tumours of the breast are very chronic in their course, and when in young persons, a tumour of the breast long remains stationary, the presumption is it is not cancer. |

### (14) *Ulceration.*

| | |
|---|---|
| Hard cancer is liable to ulcerate when advanced, and the sore which forms is peculiar in its characters, tends to spread, and is in its edges and surface cancerous. | No tendency to ulcerate, and if an ulcer does form it is a simple sore with no cancerous characters. |

### (15) *Constitutional Implication.*

| | |
|---|---|
| Cachexia sooner or later apparent, and the characters of this constitutional condition are usually distinctive. | General health usually little if at all affected, and if so, not in the same way as in cancer. |

### (16) *Other Growths.*

| | |
|---|---|
| Occasionally similar growths in other parts. | Extremely rarely so. |

It may be further added, that cancer is at certain periods of life the most common of all the tumours of the breast; so that in doubtful cases, where the symptoms would otherwise lead us to the same conclusion, the presumption is that the growth is malignant. The sum of the probability is as the excess of frequency of cancerous over other tumours in that part and at that age.

Finally, in some cases, the use of the exploring needle, and the examination of the product by the microscope, may be available under exceptional circumstances.

No mention has been made in the above remarks of the escape of a serous or sero-sanguinolent fluid from the breast, when the seat of benign growths, and its absence in malignant disease, as more extended observation has proved this test, once thought much of, to be quite fallacious.

None of the above distinctions are perhaps reliable individually (4, 5, 6, and 13 are the most instructive); but if collectively recognized, they are characteristic and distinctive. It may, however, be said, that while no one sign is quite characteristic of the cancerous nature of a tumour, yet, that in a hundred growths which have existed for some time in the mamma of a female beyond middle life, and which are hard, resistant and heavy to the hand, insensible to pressure, and have resisted simple treatment, ninety-nine will be cancerous. If lancinating pains, enlargement of the lymphatic glands, and failure of the general health, are added, the chances are infinitely small that we are mistaken in supposing the tumours cancerous. It must, however, be confessed, that few questions are more puzzling than such as are occasionally proposed to a surgeon with regard to the exact nature of some mammary tumours, and probably no kind of disease has been more frequently mistaken in actual practice. It may be added that the error of taking a simple for a malignant tumour is more frequent than the reverse of mistaking a cancer for an innocent growth.

The reappearance of a tumour in a part from which a suspicious growth had been before *carefully and wholly removed*, would render the malignant nature of both tumours almost certain. If, after the removal of a tumour from one mamma, a growth appeared in the other gland, or in the axilla, presenting the physical characters of cancer, we could have very little hesitation about its nature.

**NEUROMA.**—A fibrous tumour occurring on a nerve, developed either in its continuity or at its extremity, when it has been divided, as in a stump. These tumours may exist in great numbers (thousands even) throughout the spinal system of nerves, and lie for the most part between the fasciculi of the nerve, and may project on its one side, or present an equal enlargement for some distance along its continuity. They may be solid, or have a cavity filled with fluid of varying consistency within their substance. They are most common on the posterior tibial nerve, and are not so frequently met with in the upper as in the lower extremity.

In shape, neuromata are round, oval, or fusiform. When oblong, the long axis of the tumour usually corresponds to the direction of the nerve. To the hand they are firm, inelastic, and smooth. They are slow of growth as a rule. The skin over them is healthy and free from adhesion. In size, neuromata may vary from the head of a pin to the head of an adult. They may present themselves on any part of the body, but are most common in the nerves of the upper extremity. They occur more frequently in males than in females, and after middle life. They are often quite painless, unless roughly handled, when a sharp pain may flash along the nerve, and spasm and involuntary movements in the muscles supplied by the nerve may be excited. Evidence of deranged enervation may, however, be present, as feelings of formication, tingling, &c., in the parts supplied by the nerve. When painful, the pain affects the parts peripheral or distal to the site of the tumour. The swelling itself may be tender, or the parts around it may be more so than the tumour itself. The pain is usually paroxysmal, and may be aggravated by atmospheric vicissitudes and derangements of the digestive organs.

Neuromata are movable in a direction lateral to the nerve on which they are seated; but they cannot be moved in the axis of the nerve. If firm pressure is made on the nerve proximal to the position of the tumour, handling the tumour causes no pain either in the nerve or along the distributed branches. If the pain is not great and continuous, the general health is unaffected.

By the above signs a neuroma can be distinguished from all other tumours. It is with multiple fatty tumours, that they are most apt to be confused; but the position, size, shape, lateral mobility (only), pain, and influence of proximal pressure, will guide us to their true recognition. *Cancerous tumours* of nerves are very rare, and will show their nature by their rapid growth and the cachexia which accompanies them. Tumours lying near, but not implicating the nerve, will not cause the symptoms (especially the spasms of the limb on pressure, and the paroxysmal pain) above described. *Cystic tumours* are more elastic, and do not produce the same effects.

When a nerve is wounded, or partially divided, a nerve tumour may (traumatic neuroma) form there; and in stumps, the extremity of the divided nerve is not unfrequently enlarged, though it does not always cause inconvenience, and so attract attention. When attached to the end of the bone, or to the cicatrix (and at other times even when there is no such explanation), these neuromata in stumps are often excessively painful, especially when pressed on, and may cause spasms of a very annoying character.

**NEVUS.**—Forms in connection with arteries, veins, and capillaries; and may be confined to either set of vessels, or combine one or all of these structures in its substance. The characters of the tumour will vary in accordance with its structure, and also in a great measure with the tissues in which the nevus is developed.

Nevus is either cutaneous or sub-cutaneous, or mixed, being partly in and partly below the surface. It is usually congenital, though the arterial form occasionally appears for the first time after puberty, and it may be even in advanced life, and that apparently in consequence of injury. They may long remain stationary, resume their growth, and burst, or retrograde, shrivel or ulcerate away. In shape nevi are round or oval, flat or somewhat prominent, ill-defined and ill-circumscribed for the most part, in rarer cases they hang by a stem, and occasionally they cover plaits of pendulous skin.

A. **Arterial Nevi,** "aneurism by anastomosis" of Bell.—In this form the arterial elements so predominate as to render the tumour arterial. It may be present at birth as a very small growth, and not grow till after the interval of years, or it may appear for the first time after puberty. It may be sub-cutaneous or sub-mucous. It occurs generally on the head, though it may be met with in any part, and even in bones, muscles, and internal organs. When sub-cutaneous the surface over them may be quite healthy or scarred. Frequently the surface is slightly elevated and prominent, and may be of a purple colour. It is soft, elastic, doughy to the hand, is ill circumscribed, is enlarged when the arterial circulation is hastened or the venous retarded. It pulsates feebly and expansively with the pulse, and to the ear gives out, in general, a soft, cooing note, though occasionally the sound is harsh. The vibratory thrill felt by the hand can be seen also, in many cases, if the part is placed in a favourable position. Nevus is compressible, and the pulsation is arrested by such compression, whether it be applied to the tumour itself, or to the arteries leading to it; and when the pressure is removed the tumour quickly fills again, with a thrill and pulsation which are very characteristic. Vessels in the neighbourhood are frequently felt to be large, and to beat strongly.

It is rare that any confusion can arise between this tumour and aneurism, as the position usually occupied by it is not one in which aneurism occurs. The sensation communicated to the hand by nevus is quite different from that of aneurism. The pulsation is not of the distinct marked kind of aneurism. There is not the discoloration of the surface present in aneurism which is seen in nevus. The elements of a nevus are not so defined; the bruit is softer, more superficial, and more prolonged. The feeling produced by the return of the blood to the growth after compression is quite different from the firm distinct pulsation of aneurism; the enlarged vessels leading into the growth from the circumference, which are felt in nevus, are not found in aneurism; nor is the same distinct effect produced by compressing the main vessel above, as in aneurism.

B. **Venous.**—May be cutaneous or sub-cutaneous. Sometimes they are deep, as between muscles and on limbs and in cavities; but they occur mostly on the head and trunk (nates and back especially). They are always congenital. When cutaneous, a venous nevus is usually very small at birth; but augments, and after attaining a certain size, remains stationary, or spontaneously disappears by ulceration or absorption. The sub-cutaneous variety is occasionally of very considerable size at birth. Sometimes the venous nevus is sub-mucous, as in the lips, gums, cheeks, and rectum.

This form of nevus consists mainly of venous tissues, and follows in its condition of fulness or emptiness the veins of the part. Anything which increases the fulness of the veins, augments the nevus; while when these vessels are emptied, the tumour diminishes. The surface over these growths is smooth, and often of a dark purple colour. There is sometimes a little swelling; at other times it is distinctly prominent. It is ill circumscribed; has no pulsation or bruit. Occasionally it is lobed. It is emptied by pressure (unless consolidated), and diminished by elevation alone; while it is augmented in size, and its colour deepened, by strong expiratory efforts, as crying and coughing. When pressure that has been applied to it is removed, it slowly fills. To the hand it is soft, puffy, inelastic, and spongy, and sometimes even fluctuant.

Venous nevi are occasionally combined with serous and sanguineous cysts; and occasionally also they grow in connection with soft cancerous tumours. Sometimes, again, they are partially consolidated; and in any of these cases, their characters and features will be varied. Rarely these nevi have been seen to bleed vicariously with the menses.

Venous nevi may, in some cases, be confused with *varix;* but this latter affection occurs mainly on the lower extremities, and in adults. Varicose veins are different in their arrangement, as they lie in the course of the great vessels; they are also multiple, and are less elastic and consistent than nevus.

*Encephaloid Cancer* has also been mistaken for a nevus, and *vice versâ;* but the characters of the two affections, as given before, and afterwards under the head TUMOURS, are very different.

C. **Capillary Nevus**, or "mother's mark," is easily recognized, as it forms an oblong slightly elevated or flat stain on the surface, either having a smooth or a rough and granular appearance. It is always congenital, though it may be very small at birth. It occurs most usually on the upper half of the body, and causes little inconvenience, unless it is abraded or ulcerated, when it may bleed violently.

**ŒSOPHAGUS**, Foreign Bodies in the.—They are most apt to stick just where the pharynx ends in the œsophagus, that is, on a level with the cricoid cartilage, or at the termination of the gullet in the stomach. The foreign bodies which may be met with are very numerous, and of the most diverse shapes and sizes. They may consist of various alimentary substances, or of bodies concealed among the food. They may be composed of all varieties of substances which accident or design may introduce into the mouth. The sharper and the more angular a foreign body is the greater the irritation it is capable of producing. Foreign bodies may be so large as entirely to obstruct the passage and press on the windpipe; or they may (as in the case of small fish bones, pins, &c.) merely cause pain, irritation, and subsequent inflammation.

The distress occasioned by the impaction of a foreign body in the œsophagus is very great, even though immediate danger may not result. There is a sense of constriction at the top of the sternum, and pain of a remitting character in the neck. A constant attempt to swallow or vomit; a profuse flow of saliva, which may be tinged with blood; and difficulty of breathing, are also common symptoms. If the body is large it may, in thin persons with long necks, be felt projecting. After a considerable time the annoyance abates, and the patient can bear its presence without much uneasiness, if the passage is not greatly blocked up.

The symptoms produced vary with the nature of the body and the position it occupies. Very considerable bodies, such as a set of false teeth, have been impacted in the gullet, and have escaped the detection of even the most experienced surgeons, from the manner in which they were embedded in the walls of the tube; while, on the other hand, if in the passage downwards of an irregular body the mucous membrane of the canal has been abraded, the sensation of there being a foreign body present may persist, although it is no longer there. These facts must be borne in mind.

Irregular hard bodies lodged in the œsophagus may occasion violent inflammation, abscess, sloughing, or gangrene and perforation. Death may thus follow on the irritation or hæmorrhage, or result from the effects of the perforation. Bodies long impacted produce emaciation, hacking cough, vomiting of blood and pus, and these symptoms have even been mistaken for phthisis. Sharp bodies may pierce the tube and wound some of the great blood-vessels in the neighbourhood, or gain an entrance into the air-passages, as in a case related by Dupuytren; or passing through the tissues, make their exit by the surface, near to or at a considerable distance from the point where they entered.

Bones and metallic bodies impacted in the œsophagus have been known to cause disease of the spinal cord and erosion of the aorta; and though many instances are on record, of foreign bodies remaining long without doing harm, yet the danger is so great, that if they cannot be got rid of otherwise, we operate for their removal.

In general, to diagnose the presence of a foreign body impacted in the œsophagus is not difficult. The history of the case—the sensation produced by its presence—the embarrassment of breathing and swallowing—the detection of it possibly from without, by the hand, or by the finger, or bougie introduced into the canal—seeing it when the tongue is well drawn forward and depressed—by these means we discover the cause of the symptoms observed.

**Stricture.**—This may be spasmodic or organic.

(*a*) *Spasmodic.*—Generally occurs in hysterical, nervous, young, or middle-aged females, and depends on the same causes affecting the general health and the condition of the nervous system, as do the many other maladies which the surgeon has to treat, and which are designated hysterical. It is ascribed to, or combined with spinal irritation, derangement of the uterine or digestive functions, worms in the intestinal canal, moral emotions, the ingestion of acrid substances, drinking cold fluids when the body is hot, &c.

The contraction is due to spasm of the constrictor muscles of the pharynx, and it lies high up in the tube. Besides those symptoms more especially referable to the œsophagus, a patient suffering from spasmodic stricture usually presents some of the other well-known phenomena of hysteria. There is more or less dysphagia, pain deep in the throat, or a feeling of something being bound tightly round the upper part of the thorax, which impedes the breathing and swallowing. The sudden appearance and as sudden departure of the symptoms; the exaggerated expression the patient employs with regard to them; their great violence at times, especially when the mind is directed to them; and their occasional occurrence periodically, are characteristic of the malady. There is no emaciation, and no adequate reason given for the occurrence of the symptoms, which are usually referred to some trifling cause. Sometimes it will be observed that certain articles of diet alone induce spasm, while others, apparently as formidable, or even more so, fail to produce such an effect. Occasionally it is cold things alone that arouse the spasm, at other times those that are hot excite it.

The passage of a bougie (perhaps under chloroform) will clear up all difficulty in the diagnosis.

(*b*) *Organic* may be either simple or malignant, and usually occupies either the highest or the lowest part of the œsophagus. It is most common close to the upper end, but it may occur in any part of the tube. It is usually simple, and may be due in very rare cases to congenital malformation; or it may arise from injury or inflammation, as that caused by drinking boiling water or caustic solution. The mucous membrane gets thickened, and the cellular tissue beneath becomes the seat of effusion when violent inflammation has pre-existed, and cicatricial tissue may greatly contract the calibre of the tube. Strictures which are at first simple may ultimately become malignant. The thickening increases by degrees, and its extent will depend on the violence and degree of effusion. It may be very limited, both in superficial extent and in depth. It may exist only on one side of the tube, and then it interferes comparatively little with the integrity of the canal; or it may be so narrow, as to appear as if a ligature had been tied round the tube. At other times it is extensive, surrounds the whole canal, and dips deeply among the tissues, and ultimately augments to that degree that the canal is all but obliterated. It is more common for the constriction to involve the whole circumference of the canal, than only to affect part of it. Below the point of stricture the canal is generally normal, but above the tube is usually dilated, and even largely sacculated, forming a receptacle for the food, where a species of digestion may go on. Ulcers frequently are found both above and below the seat of stricture, and occasionally these ulcers lead to perforation, and the formation of a fistulous opening between the œsophagus and some portion of the air-passages or the neck.

A patient affected with organic stricture becomes gradually aware of a difficulty in swallowing as the obstacle slowly forms, and then suddenly a larger piece than usual sticks as the canal contracts. Considerable uneasiness early attends the affection —uneasiness not always clearly referable to the throat, but complained of in the chest and in the region of the neck generally, shooting to the back between the shoulders, and sometimes being most intense at the xyphoid cartilage.

Deglutition becomes more and more difficult, till solids at any rate will no longer pass. The ingesta appear to the patient himself to reach a certain point and then become arrested, after which they may slowly and painfully pass onwards; or, what is more frequent, when the stricture is at all tight, they regurgitate and are expelled. This process is generally accompanied by much uneasiness, if not actual pain, though occasionally it may give rise to little annoyance. The higher up the stricture is placed, the sooner after the effort to swallow will this rejection of the food occur. Pain attending deglutition is so great in many cases as to produce a constant dread. Spasm is sometimes caused by the presence of the food in the throat, and adds to the evil; and a sense of suffocation may follow. The voice is often affected, and sounds as if some foreign body were in the windpipe. The inability to partake of a proper amount of nourishment, together with the pain and anxiety incident to the affection, exerts a most pernicious influence on the whole system. The body is not properly nourished, and becomes emaciated. The digestive organs exhibit signs of derangement. The nervous system loses tone. The mind becomes prostrate, and before the fatal result, which too surely follows, mind and body are generally reduced to the last stage of exhaustion.

The history and symptoms of this affection are usually so clear as to make its recognition easy; but if any doubt exists, a bougie may be passed, and so the stricture discovered. If the head is well thrown back, and the point of the instrument carried along the back of the pharynx, it can be introduced without difficulty to the seat of the stricture; and then, by the degree of resistance it meets with, and the sensation communicated to the hand as it passes within the strictured part, the rigidity, and it may be the extent of the constriction, may in many cases be determined.

Difficulty of swallowing is thus the leading symptom of both kinds of stricture, and when present it is too apt to be considered distinctive of such an affection, whereas it may be due to various other conditions, the absence of which should be determined before an opinion as to its dependence on stricture of the œsophagus is arrived at. (*See* DYSPHAGIA, p. 221.) Many of these are easily recognized; others can only be discovered by careful investigation.

In simple organic stricture, a large amount of glairy mucus is generally expelled; while in the malignant form of the disease, when at all advanced, pus, and blood, and sometimes shreds of tissue, are expectorated. The neck is enlarged, the glands become affected by secondary deposition, and the patient has the cancerous cachexia.

In thin persons, if a stricture attended by considerable deposition be present high up, it can often be recognized by the hand when the fingers are pressed behind the trachea, and the patient makes an attempt to swallow.

In paralysis of the œsophagus (a rare affection), we may have symptoms which closely resemble stricture, but the passage of a bougie will differentiate them; while the fact that in paralysis solid substances of some size may be swallowed with ease, while the difficulty attends the swallowing of liquids, is just the opposite of what we find in stricture.

When the stricture is simple, the passage of a bougie causes much less irritation, and it is not followed by bleeding, as it is when malignant disease is present. The hand, too, distinguishes a roughness and irregularity of surface in malignant, which is not present in simple stricture.

**Malignant Disease.**—The œsophagus is occasionally the seat of cancer, more rarely, however, than other parts of the alimentary tract. The cancer may be hard, sôft, or epithelial. When present, the local symptoms are those of obstruction accompanied by severe stinging pain. The constitutional signs are partly those common to cancerous disease in any part, and partly due to the deficient nutrition, which follows the partial or entire closure of the canal. Cancers produce annular stricture of the œsophagus, and bind it to the vertebral column. Ulceration may lay open the neighbouring vessels, and destroy the tissues lying between the œsophagus and the air-passages. When perforation of the tube has taken place, the ingesta may escape either into the air-passages or into the surrounding soft tissues. This disease is met with most frequently in elderly females, and is recognized by the history of its invasion and progress, together with the general and local effects which it produces, and the results of an exploration, which must in such a case be conducted with the utmost delicacy and caution. There is often an oblong swelling felt in the throat. The glands are enlarged, and in some cases the discovery of hard cancerous glands in the neck may be our chief reason for surmising the presence of malignant disease in the throat. There is foul and bloody discharge, and the bougie, if passed, perceives the rough irregular surface, and its introduction is followed by profuse bleeding.

**OVARIAN DROPSY.**—Dropsy of the Graafian vesicles. It is only with regard to the recognition of the tumour after it has ascended into the abdomen, that I take here to do.

The history is, that a swelling appeared in one of the iliac fossæ, with (generally) or without previous annoyance from the pressure of the tumour when confined to the pelvis on the rectum, bladder, &c., and that as the tumour rose into the abdomen, these pressure effects diminished or disappeared.

In place of retention, there may be now incontinence of urine, and piles may remain from the previous interruption to the circulation in the hæmorrhoidal vessels. The tumour, we are informed, increased slowly, and the general health was little, if at all, affected, till the growth had continued for a considerable time. In size, an ovarian dropsy may vary much; and it may, if seen early, still lie chiefly on one side in the lower part of the belly. If it has attained a great size, its lateral position will be no longer apparent; and various effects produced by pressure on abdominal and thoracic organs may be observed, as interference with the nutrition, derangement of the digestive and urinary organs (decreased secretion of urine), palpitation, dyspnœa, especially when the patient is in the recumbent posture, &c. The tumour may be unilocular or multilocular. The cysts may be separate or communicate with one another. Sometimes they inclose solid contents, fleshy bodies, hair, teeth, bones, &c.; occasionally hydatids occupy them. One ovary (and that most generally the right) only, or both, are affected—one being, however, more diseased than the other.

Ovarian dropsy may appear in patients of any age short of extreme old age; but it is in married females who have borne a family, and whose catamenia are about to cease, or have just ceased, that it is most common. If the tumour is large, emaciation, chiefly apparent about the neck and shoulders, appears. The face is "drawn" and anxious, and there will probably be œdema of the lower extremities, though this symptom generally occurs late in the disease, and then, also, the veins may become prominent on the abdomen, and numbness and weakness of the limbs may be complained of. The catamenia are sometimes regular, sometimes suppressed, and sometimes augmented, in ovarian disease. If the dropsy affects both ovaries, the menses will no longer appear.

On examination (before which the bladder and the rectum should be emptied), when the patient is laid on her back with her knees drawn up, the abdomen is found distended, and sometimes the veins on its surface are enlarged and tortuous. The tumour remains tolerably prominent, and does not flatten out as in ascites. It is dull on percussion all over its anterior surface, while the resonance of the bowel is found behind in the flanks. Frequently one flank is dull when the tumour is large and the patient made to sit up, and the other flank clear (in great distension from ascites, so great as to destroy the test of the hydrostatic line of level, both loins are dull), showing on which side the ovarian disease began—a point further elucidated by observing which side the uterus is pushed to. The surface of the tumour is smooth or nodular, and fluctuation will be more or less apparent. The fluidity of the contents, the thickness of the parietes, the density of the sac, and the size and distension of the cyst, will cause the fluctuation to be more or less evident. If adhesions do not exist in front, the tumour may be made to move about, and the parietes may be got to slide over it, or may possibly be pinched up from its surface. When a deep inspiration is made, also, the abdominal parietes will slide over the tumour, if the adhesions are not close. Mobility, too, by vaginal and rectal examination, will be observed. If the tumour is large, we cannot determine much about the adhesions; and in no case can we obtain reliable information with regard to the deep connections of the growth. When superficial adhesions exist, a sort of crepitation may be observed on sliding the parts over the surface, or changing the position of the patient; but this sign is not of real value unless it is constant. If the cyst has been repeatedly tapped, then we have very good grounds to suppose that there are adhesions at the front.

By the vagina, the os, though drawn up during the early stages of the disease, is found pushed down when the tumour is large, from the growth getting above and depressing the womb, which organ, again, may be thrust forwards or backwards, or to the side, or may be prolapsed. Little or no influence is produced by "ballottement."

By the anus the tumour can be felt; and lastly, if a slender trochar and canula is inserted, and the product examined by the microscope, they will, according to Dr. Hughes Bennett, indicate the nature of the affection.

To distinguish whether a cyst is unilocular or multilocular, is often impossible; but if the surface of the tumour present inequalities; if there are several centres of fluctuation, and the wave is not observed to pass throughout the tumour from side to side; if by the rectum and vagina, we can make out several separate bosses or protuberances; if smaller and denser portions can be found combined with the more fluid, then we have reason to surmise that the cyst is multilocular or composite.

After an ovarian cyst has been punctured, a sound can be passed through the canula, and much information obtained as to the size of the cyst, the presence of secondary cysts, solid contents, &c.

Ovarian dropsy sometimes spontaneously evacuates itself by the uterus, bladder, and bowel. Death takes place by inflammation of the sac, or its bursting into the abdomen.

Ovarian dropsy has to be distinguished from pregnancy; ascites; distended bladder; dropsy of the uterus; chronic peritonitis; solid uterine benign tumours; malignant disease; phantom tumours; cystic tumours of the abdômen; accumulation of fæces; and enlargement of some of the abdominal organs.

(1) *Pregnancy* may be combined with ovarian dropsy; and even in cases where no pregnancy exists, the patient may be supposed to be in that condition, from the enlargement of the breasts and their becoming painful, the appearance of the areola and the secretion of thin milky fluid, and even the occurrence of morning sickness, all of which may appear in ovarian dropsy alone.

When the ovarian tumour rises out of the pelvis, and can be carefully examined, there is less risk of this mistake.

A pregnant uterus lies in the median line of the abdomen as a rule (in rare cases only is it lateral), and is of a pear shape. It is solid, and not fluctuant, as ovarian dropsy is. The history and duration of the tumour will in most cases be very significant. By vaginal and rectal examination, we will discover the state of the os and the uterus. By auscultation, the placental souffle and fœtal pulse (very rapid, and not corresponding with that of the patient) will be heard, and the movements of the child are usually felt by the mother, or by the surgeon—these, together with the influence which firm pressure above the pubes produces in causing contraction of the womb under the hand (an effect not observed in ovarian tumour), will all assist us in our diagnosis.

As regards the souffle, care must be taken not to confound the tubular sound caused by mere pressure upon the great vessels with the true placental murmur. If the child is dead, then the stethoscope teaches us nothing; but the condition of the os and cervix, the previous movements of the child, the ballottement, and there being no fluctuation, together with the other signs of the presence of a dead fœtus, will indicate the nature of the abdominal tumour.

Extra-uterine pregnancy is differentiated by the history connected with it, and a careful external and internal examination, and by the absence of the signs of ovarian dropsy.

(2) *Ascites.*—See p. 106.

(3) *Distended bladder*, as when retention of urine is produced by a dislocated womb. The tumour is here central, there is a different history, and vaginal and rectal examination will discover the difference between it and ovarian dropsy. The tumour is in front and not behind the womb; and, finally, the use of the catheter (which in all examinations connected with tumours of the abdomen ought to be employed) will at once show us what we have to do with.

(4) *Dropsy of the uterus.*—See p. 109.

(5) *Chronic peritonitis.*—Here the tenderness on pressure, the history of the case, and the symptoms indicative of the affection referred to, will guide our opinion.

(6) *Solid uterine benign tumours* (fibroid).—These are more solid, hard, and heavy than ovarian dropsy. They are nodular on the surface, their contour is more broken, and they are frequently multiple. They are not so rounded as ovarian cysts. If the finger is introduced into the rectum, and the sound passed into the uterus, a most complete examination of the characters of the tumour can be made. The uterine sound will show the direction and increased length of the cavity of the womb (it is elongated when fibroid tumours exist in it), and the difference of position between such a tumour and those of the ovary, and also that the whole mass can be moved

from side to side with the womb, while ovarian tumours remain immovable on a like manœuvre. The cervix uteri is usually in the middle line in the case of a uterine growth, and not displaced and drawn to one side, as in ovarian tumours. The uterine tumour, too, is median, and not lateral. There is no fluctuation; and on pressing the tumour above the pubes, or employing galvanism, the uterus will be in general felt to contract on the growth, showing its uterine origin. Ballottement will be apparent, which it is not in ovarian dropsy; or at least (if it exist at all), it is not so distinct by any means as in uterine tumours. According to some, the edge of the hand can be pressed down between the internal abdominal wall and a non-adherent ovarian tumour, but not between the wall and a fibrous tumour of the womb. Uterine tumours are generally slower in their progress, and give rise to hæmorrhage, frequently of a violent character, which is not the case with ovarian dropsy. Uterine tumours do not attain so great a size, are rarely painful, and if it were thought necessary, they might be punctured, and the product examined by the microscope.

On auscultation, a vascular murmur like a placental souffle (in the intra-parietal form of the fibroid at least), and also a tubular souffle from pressure upon the great vessels, can generally be heard. A thrill, too, is distinguishable in many cases; and besides these, a single or double cardiac sound will be heard.

(7) *Malignant disease of the ovary* is more rapid in its growth than dropsy. There is no fluctuation. The tumour is uneven and heavy. There is pain and cachexia, and the abdominal glands are affected.

(8) *Phantom tumours.* See page 108.

(9) *Cystic tumours* of the abdomen, seated in the walls or cavity. They are rare in the former position, but occur occasionally in connection with the viscera (mesentery, omentum, kidney, or liver). Sometimes they are hydatid. It is often impossible to distinguish them when they are seated in the walls. See page 109. In other cases the history is our chief guide; the mode in which the tumour began; the point from which it grew; the place where the pain was most felt;

the disordered functions of the viscera that are diseased; and the gradual progress of the affection. Generally these tumours do not pass down into the pelvis, and a line, clear on percussion, may be found below them, especially if the patient is placed with the shoulders low, and the tumour is drawn up. When this is done there will be dragging produced on the womb.

(10) *Accumulation of fæces.*—The irregular doughy feeling; the dulness on percussion, and possibly the resonance at parts where flatus exists; the constipation, or merely liquid stools; the ability to displace or indent, or break down, the mass by pressure; and lastly, the effects of medicine.

(11) *Enlargement of the liver, kidney, or spleen* can only, by carelessness as to the history and accompanying symptoms, be mistaken for ovarian dropsy. The information obtained by vaginal and rectal examination ought of itself to be sufficient to clear up the diagnosis. When the patient is recumbent these tumours can be pulled up (but little downwards), and no influence is thereby produced on the uterus. The early history and progress of the disease; its point of origin; the shape of the tumour on percussion; the deranged function; the consistence and feel to the hand; the absence of fluctuation; and in enlargement of the spleen, the state of the blood surcharged with white corpuscles—will point out the affection present.

**OZŒNA.**—A fœtid, irritating, ichorous discharge from the nostrils, arising from ulceration of the mucous membrane, combined or not with necrosis of the bones beneath. It may be caused by such ulceration as sometimes accompanies the exanthemata, especially malignant scarlet fever and erysipelas; and it may be due to cancer, scurvy, or glanders. In these cases it will form but one (and not probably the most prominent) of many symptoms. It is as connected with scrofula or syphilis, separately or combined (in which latter case the worst form occurs), that we are most frequently ealled on to treat ozœna. When it is due to scrofula, we will have evidence of the strumous diathesis to point out its cause; while the past history and other concomitant symptoms will indicate a syphilitic origin, if such exist. By a careful examination of the nostrils in a strong light and in a fitting position, with or without the aid of a speculum, we will usually see the lesion from which the discharge comes, unless it be very high up.

The bones are more apt to be implicated in the syphilitic, than in the scrofulous form of ozœna; and then, too, the discharge is peculiarly copious and offensive. The bones may be so completely destroyed as to throw both nostrils into one, and the palate and bones of the face may partially or wholly disappear, and be discharged with the pus. Sometimes the nostrils are blocked up by thick crusts formed by the dried secretion; and as the disease advances the sense of smell is impaired or lost.

By causing the patient to close the mouth, and make an expiration, we can satisfy ourselves that the fœtor observed does not come from the mouth.

**PAROTID**, TUMOURS OF THE.—Both innocent and malignant growths have occasionally their seat on or in (more rarely) the parotid gland.

Serous and sanguineous cysts are sometimes developed over the gland, and fibrous, fibro-cellular, cartilaginous, solid glandular, myeloid, scirrhous, and encephaloid tumours occasionally grow in this region. The various *simple tumours* mentioned may occur in a distinct or combined form. They may be very small when presented to the surgeon, or as large as a melon. They may lie superficially to the gland, be embedded in its substance, or be placed deeply within its structure. These growths are of many shapes, but are commonly round. They are often lobed, and are in general sessile. Parotid tumours are of varying consistency, being in general firm; but they may be hard at one place and soft at others. They grow, for the most part, slowly, and with little pain, except so much as results from pressure. They may, after attaining a certain size, become stationary, and again suddenly take a start, to become again stationary after an interval. They grow in general outwards, but may pass behind the angle of the jaw, and deep among the tissues of the neck, so as even to press on and impede the breathing and swallowing, and to embarrass the cerebral circulation. They are not usually well circumscribed, but are tolerably movable. If they contain a cyst, fluctuation will be perceived, if it lies near the surface; the gland becomes compressed, and its function is in some measure diminished. It is rare that facial paralysis is caused by simple tumours; and if paralysis does appear, it is late in the history of the case. The skin over these tumours is usually unaffected till it gets distended by the growth of the tumour. The integument, though it may be thin, generally slides over the surface of the swelling. The capillary vessels are not abnormally apparent.

A mere enlarged gland lying over the parotid may be distinguished from a tumour of the parotid by its shape, and there usually being more than one gland implicated.

The intimate character of the growth may be surmised from its consistence and weight; by its size and connections as discovered by a careful examination of its deeper portions; and its influence on neighbouring parts.

*Malignant disease* of the parotid usually consists of hard cancer. It may grow slowly, but more commonly it increases with rapidity. It spreads laterally and deeply, as well as outwardly, and it invades the whole gland, and amalgamates itself with the deep tissues of the jaw and neck. It pushes upwards the external ear, compresses the auditory canal, destroys the hearing, and, by its deep prolongations, may compress the great vessels of the neck, impede the venous return from the brain, and embarrass mastication, deglutition, and respiration. A malignant tumour soon fixes itself firmly, and becomes adherent to the skin lying over it. It is stony hard, or irregularly soft and elastic, according to the kind of cancer. It usually gives rise to severe lancinating pain, which is increased by movements of the jaw. In rare cases, malignant tumours of the parotid are painless. The portio-dura gets involved in the tumour, and so facial paralysis is established, and that frequently at an early stage of the growth. The general health ultimately gives way, and the cancerous cachexia appears. The glands on the side of the neck get involved, ulceration takes place, and a cancerous sore is produced. A tumour can, when it passes deeply behind the jaw, be felt by the finger passed into the pharynx.

Simple tumours of the parotid are distinguished from malignant ones by the following characters:—

(1) Simple tumours are better defined and circumscribed.

(2) Simple tumours are slower and more painless in their growth.

(3) Simple tumours are more movable.

(4) Simple tumours grow more outwardly than deeply or laterally.

(5) Simple tumours do not so tend to bind together underlying and overlying parts.

(6) Simple tumours do not affect the glands or general health.

(7) Simple tumours seldom cause facial paralysis; and if they do produce paralysis, it is only late in the case.

(8) Simple tumours are not liable to ulceration; and when ulceration does occur, the sore is healthy in character.

(9) Simple tumours usually occur (except cartilaginous) in younger patients than cancer (hard cancer at least).

PATELLA.—*See* FRACTURE and DISLOCATION.

## PROSTATE GLAND.

A. **Inflammation.**—(*a*) *Acute.*—Is usually dependent on the extension of inflammation by continuity of tissue from neighbouring parts, as when it spreads from the urethra and bladder. External injury, too, as blows on the perineum; the awkward employment of instruments; calculi; the injudicious use of turpentine, cantharides, cubebs, strong alcoholic and acid drinks, &c.; strong injections or cauterizations; stricture of the urethra; cold applied to the perineum; and possibly irritation of the rectum—may all be the cause of this malady. Of all these reputed causes, gonorrhœa is probably the most common; and in recognizing acute prostatitis, the previous existence of a gonorrhœa would be a most important aid.

When present, there is pain, often of a very violent kind, tensive and pulsatile, deep in the perineum and in front of the anus, where pressure augments it. The pain will afterwards be experienced, not probably in the perineum alone, but in the penis, loins, and thighs. There is irritation of the neck of the bladder, leading to frequent desire to micturate; and pain and straining accompany the act, and are especially observed at the end of the process. The urine may be expelled in a very small stream, or only drop by drop, and retention may be induced. The urine causes a burning sensation when it is passed. It is usually high-coloured, and deposits after a time more or less mucus. If the bladder gets affected, as it sometimes does, then there may be blood and pus in the urine; and as the disease subsides, the discharge of mucus is generally very considerable.

Frequent desire to evacuate the rectum is a further symptom of common occurrence, as it is pressed on by the enlarged gland; and defecation becomes painful. When there is considerable swelling, the fæces, if consistent, will probably be flattened or grooved.

The constitutional reaction is often by no means slight, and want of sleep and irritation soon tell on the general health. If retention is established, and not relieved, irritative fever and delirium may appear.

The finger introduced into the rectum finds the gland enlarged, hot, and tender. A sound cannot be passed into the bladder without occasioning much suffering; and between it and the finger placed in the rectum the condition of the prostate may be best determined.

Acute prostatitis may resolve, or become chronic, or lead to hypertrophy; or it may end in suppuration, and even in rare cases in gangrene.

If suppuration takes place, a rigor will probably mark its advent. This rigor, followed by sweating, may recur so as to assume a distinct remittent character. The pain becomes pulsatile and heavy. The irritation in the urinary organs, and possibly in the rectum, augments. Retention may supervene. The perineum becomes hard and brawny. Rectal examination causes great pain, especially if a sound is at the same time placed in the urethra. A boggy, elastic sensation is felt when the gland is pressed from the side of the bowel; and if the collection of matter is great, this elasticity and fluctuation may pervade the whole gland. The prostate will be enlarged, and the nearer the pus collection is to the bowel, the more clearly will the position and size of the abscess be defined. The pus may burst either into the urethra (which is most common) or into the bladder, the rectum, the cellular tissue of the pelvis, or on the perineum.

Acute prostatitis may be distinguished from inflammation of the neck of the bladder by a rectal examination, when the pain on the finger being pressed up against the gland is very significant. Calculus of the bladder, impacted at the neck of the organ, is differentiated from inflammation of the prostate gland by a similar examination to that just referred to, and by the retention of urine being more temporary in the case of stone, and relieved so soon as the calculus changes its position.

(*b*) *Chronic Prostatitis* is produced by the same causes (only less violent and probably more prolonged in their application) as induce the acute form of the disease. It is not an uncommon affection of middle-aged men, and it may occur in young persons as a result of neglected or mismanaged gonorrhœa. There is a dull weight and discomfort in the perineum and neck of the bladder, and a feeling as if there was a foreign body in the rectum. There is a slowly increasing difficulty in evacuating the bladder. This inability to empty the bladder is often the first sign which attracts attention. There is at first a frequent desire to micturate, and this desire is so urgent that it must be instantly complied with. The stream comes with diminished force, and the last drops are slowly and painfully expelled. Retention with overflow is sometimes established, the urine dribbling away. The urinary symptoms are aggravated in many cases in a remarkable manner by cold and damp weather, errors in diet, fatigue, and the use of alcohol. The urine is frequently thick, ropy, and smelling; the muco-purulent mixture coming only with the first portion of the urine, if the bladder is not implicated. The general health becomes impaired and the strength diminished. When the finger is introduced into the rectum, the whole gland, or one of its lobes, may be felt augmented in size, though such augmentation is by no means universal in this disease. Pressure upon the gland causes pain. There is also some pain felt when the perineum is pressed on, and also occasionally after micturition. If a catheter is introduced, its passage will be obstructed, and it may be turned to one side, as it enters the bladder. It is especially at the position of the prostate that the instrument causes pain. Piles often accompany this malady, and the fæces may be flattened or grooved in front by the pressure of the gland. When straining at stool, and even during the intervals of defecation, or it may be after micturition in occasional instances, clear or ropy mucus, even in considerable quantity, may be discharged from the urethra, and is apt to be mistaken for semen—a mistake which the microscope will easily rectify. There may, however, be true seminal emissions at night in chronic prostatitis, and the sexual appetite is usually much diminished.

B. **Hypertrophy**.—This is a disease which was long thought to be common in the old, and to be rarely altogether absent after sixty years of age; but recent investigations have tended to show that it is by no means so common as was supposed. It may be general or partial, and may be associated with the formation of benign tumours in the gland. It may involve the muscular, glandular, or fibrous tissues of the prostate separately or combined. It may attain a very considerable size indeed, one portion of the gland being usually, however, more enlarged than the rest. This affection becomes slowly developed. The rapidity with which the symptoms are evolved, will depend in no small measure upon the part of the gland which is affected. Some constitutions also suffer more severely and earlier than others from the effects of this disease. The symptoms are chiefly those which are due to the mechanical obstacle which the enlarged gland presents to the escape of the urine. There is less force in the expulsion of the stream, though the straining to propel it is great. If a catheter is introduced, and so the mechanical obstruction removed, the urine is forcibly ejected; showing that the power of the bladder is unimpaired. The stream may be variously twisted, or may be suddenly arrested. The urine takes longer to appear at the beginning of the act of micturition, and the patient in time comes to assume various attitudes in order to assist the flow. There being a considerable hollow behind the enlarged prostate, the urine accumulates there; and as such a pouch is on a lower level than the vesico-urethral orifice (pushed up, as the orifice is, by the gland), it does not allow of the escape of the urine. The middle lobe, too, of the gland is sometimes so shaped as to permit of its falling against and closing the orifice like a valve; and the patient learns by experience to assume such a posture as will allow of the displacement of this valve-like process, and so to suffer the act of micturition to proceed.

There may be small rounded tumours in the prostate gland, without any enlargement of the gland itself which can be distinguished by rectal examination. Such a tumour may mechanically obstruct the escape of the urine; and as it cannot be felt, we are apt to explain the retention by supposing that there is paralysis of the bladder, when no such affection exists.

In hypertrophy of the prostate the last drops of the urine seem especially difficult to be got rid of, and frequently a feeling of incomplete evacuation remains.

An involuntary discharge of some urine after micturition is supposed to be completed is sometimes a very annoying symptom. After defecation an unsatisfied feeling generally remains. Piles are common, and even prolapsus of the mucous membrane may be produced by the straining which is necessary to evacuate the bladder.

Retention, though usually late of appearing, may be among the first symptoms of the disease. Incontinence occurs in rare cases, from the neck of the bladder being kept stretched and open, by the middle lobe of the gland wedging asunder the two lateral lobes. In time, if the urine is retained, the bladder gets diseased, hypertrophied, dilated, and perhaps sacculated. The ureters, too, get enlarged and hypertrophied, so as even to form a tumour recognizable during life. The pelvis of the kidneys also may become dilated, so as to form large cavities, and the urine gets decomposed, ammoniacal, and most offensive. Slimy mucus and pus, sometimes mixed with blood, and deposits of the phosphates, appear in the urine. There is heavy aching pain in the back, groin, and bladder, shooting round the pelvis, down the thighs into the glans, and occasionally into the testicle. Dribbling or overflow adds greatly to the patient's discomfort. Erections are sometimes complained of, and the general health breaks up from the irritation of the primary disease, and ultimately from the super-induced disease of the bladder and kidneys.

If the finger is passed into the rectum, the enlargement of part (and what particular part), or of the whole gland, may be determined, as well as the direction of the enlargement and its consistency; and a sound introduced into the urethra detects the altered direction of the canal, the increased length of the prostatic portion, and the obstruction at the neck of the bladder. A sound or catheter should be placed in the urethra before we examine by the rectum, as we will then be better able to distinguish with accuracy the kind of enlargement and its amount, by pressing the finger up against the instrument. A steel catheter, with a short bulbous extremity, answers best for this purpose. If we use a full-sized catheter we gain much information, by observing when the urine flows; whether the distance into the cavity of the bladder is much increased; and whether the point requires to be much elevated before the urine flows away; and also whether in passing through the prostatic portion, or in withdrawing the instrument, the point gets deflected to one side, showing that there is enlargement of the gland on the side opposite to that towards which the point is turned.

If a short-beaked instrument is employed, the state of the canal at the neck of the bladder, as regards direction, position, relation to growths, &c., can be very accurately determined, by moving the instrument to different sides, rotating it, &c.; observing whether it meets with any obstacle in entering the bladder; in what position that obstacle lies; how the instrument must be moved in order to pass it; whether the catheter can be withdrawn without difficulty; whether it turns easily, &c.

In examining the prostate the patient should lie on his back, and the surgeon, standing on the left side, uses the left hand to explore the gland. The thighs must be bent, and the shoulders slightly raised. The finger, well covered with glycerine or oil, is introduced slowly and gently by a succession of half turns.

Enlargement of the prostate is distinguished from calculus, or other tumour of the bladder, from paralysis of that organ, and stricture, by rectal and urethral examination, as above noted. The age of the patient; the obstruction being at the prostate gland, and not in the urethra; no foreign body being detected in the bladder; and the succession of symptoms above described, can leave no doubt upon the mind of the surgeon as to what the disease is.

If the enlargement of the gland is great, and the patient thin, we can, after evacuating the bladder and relaxing the abdominal parietes, examine the prostate, by introducing one finger into the rectum, and placing the other hand above the pubes. If the prostate is of normal size it cannot be felt at all in this way.

C. **Tubercle of the Prostate** is difficult to recognize. The tubercular matter may exist in a crude or softened condition. It is usually infiltrated through the substance of the gland. It is only by observing the constitution of the patient and the state of his other organs, especially the lungs, kidneys, and testicle, and connecting these with symptoms of irritation at the neck of the bladder—frequent desire to micturate and uneasiness in the act—the passage of blood before or after the urine, or between the acts of micturition, and sometimes the appearance of muco-purulent and gritty matter in the urine, and by the pain in the loins and perineum—that we come to suspect a tubercular condition of the gland. When, by a rectal examination, we find an enlarged state of the prostate, with soft spots on its surface, we can, with some confidence, believe this condition to be present.

When the tubercular matter has been evacuated, the prostate gland, in place of being augmented in size, is diminished.

D. **Cancer of the Prostate** is a very rare affection. It is usually as a primary disease it occurs, when it does appear, though it may follow similar disease in the bladder or penis. It is the encephaloid form of cancer that is met with usually in the prostate. Scirrhus is extremely rare.

Cancer of this gland has only been seen in the very young, and in persons who have previously suffered from hypertrophy of the gland. In the latter case the size of the gland will undergo rapid augmentation, the symptoms will be greatly aggravated, and the patient become cachectic so soon as the malignant disease is developed. The lymphatic glands in the neighbouring, and also those along the iliac vessels and in the inguinal region, become affected. The cancer may also appear in other organs, and death will not be long delayed, as the disease runs a rapid course, especially in the young.

On examination, the gland is found throughout greatly enlarged and very irregular in outline. In consistence, it is hard at some parts, and soft and elastic at others. There is usually great pain and suffering, both from the disease itself and also from the obstacle formed to the escape of the urine. Repeated and severe hæmorrhage from the urethra, deep cachexia, and wide-spread and very severe pain, are further symptoms of the malady. If ulceration occurs, malignant debris and cancer cells may occasionally be found in the urine, and the passage of a catheter causes great pain, much bleeding, and a sensation of contact with a rough surface.

**PYÆMIA,** or purulent infection, arises from the circulation in the blood of some decomposing or poisonous ingredient, derived from suppuration in some of the tissues; and, in consequence of this intermixture, the blood tends to coagulate in the vessels during life. Pyæmia gives rise to symptoms of low typhoid fever, accompanied by embarrassment of function in those organs in which the secondary or metastatic abscesses form, which constitutes one of the leading features in the pathology of the disease. If there is a wound, it may or may not change its character when the pyæmia sets in; and the veins and lymphatic vessels leading from it may or may not show signs of inflammation or irritation.

A rigor setting in suddenly, and being severe in its character, followed by profuse perspiration, is the most common of the early symptoms of pyæmia. The rigor, in some cases, is slight and evanescent; but more commonly it is severe, and may recur irregularly or at such stated periods as to present all the appearance (with the succeeding sweats) of a quotidian or double quotidian ague. Nausea, too, and vomiting; a rapid pulse, which soon flags and becomes feeble and intermittent; irregular action of the bowels; a brown, dry, and furred tongue; high-coloured urine; pains of a wandering or fixed character in the limbs or joints; a yellow colour of the skin, which varies in shade from bright yellow (rare) to a dark dirty hue, are further symptoms. The discoloration referred to begins on the trunk, and sometimes appears later in the conjunctivæ. The breath and sweat have a peculiar sweet smell, like new hay. A stitch in the side, accompanied by dyspnœa and dry cough, or pleurisy, pneumonia, or pulmonary abscess, occur. Effusions into the joints, accompanied usually by most atrocious pain; erratic erysipelas; hiccup; great prostration; anxiety of countenance (which gets pinched and wan); rapid emaciation; often delirium, and death in from one to many weeks. Such is the train of symptoms commonly observed; and though all the symptoms are seldom fully portrayed (several of them being frequently much modified or even wanting), yet they constitute the typical progress of the complaint. The chest or the joints may become implicated, and pus be poured out, without any pain or embarrassment of function being complained of.

Sometimes the disease invades the system most insidiously. There are no marked rigors, but intense prostration and low intermittent fever. The breathing will most usually be embarrassed and the skin icteric; and if there are visceral inflammations and effusion, other signs will be shortly added.

It may be said that if, during the progress of a suppurating wound, we find rigors followed by sweating suddenly and rapidly setting in, and being repeated and followed by prostration and typhoid symptoms (brown tongue, sordes, low delirium, &c.), and especially if the skin gets yellow and the sweat and breath have a sweet smell, and further, if there is any evidence of visceral inflammation or effusion, we can have little doubt as to the formidable enemy which has taken possession of our patient. Even if, without other apparent cause, a patient, during the progress of a suppurating wound, becomes suddenly prostrate and typhoid, though no other sign be present, we may have a very strong *suspicion* of what has occurred. If abscesses form in the soft parts, the doughy feeling they communicate to the hand, and the red blush over them, will indicate their presence.

Pyæmia has in some of its stages or types to be distinguished from

(1) Low or typhoid fever, (2) Rheumatism, (3) Visceral inflammation, (4) Glanders; and in general the distinction is easy.

(1) *Low or Typhoid Fever* does not present the same recurrence of rigors. There is not the same early prostration; the yellow colour of the surface; and the peculiar odour of the sweat and breath.

In pyæmia, too, we have not the abdominal symptoms and peculiar eruption seen usually in true idiopathic enteric fever.

(2) *In Rheumatism* the articular pains are primary, and do not follow other symptoms having no connection with rheumatism, as in pyæmia. The joint pains in pyæmia, if disconnected with the rest of the symptoms of the disease, cannot be confounded with those of rheumatism; and then there is not the erysipelatous redness and œdema which mark the purulent effusions into the joints.

(3) *Visceral Inflammations* (lungs, liver, &c.) are not accompanied by the other signs which denote pyæmia.

(4) In *Glanders*, the history, the peculiar eruption, and nasal discharge, all point out the character of the affection, though doubtless pyæmia is often conjoined with glanders.

**RANULA.**—A cystic tumour below the tongue. It may be formed by a dilatation of the sub-maxillary duct, which by chronic inflammation, calculus, or other cause, has become obstructed; or it may be due, as it not uncommonly is, to the formation of a distinct cystic tumour (serous or mucous) beneath the tongue; and possibly in some cases it arises from the abnormal enlargement of a bursa placed between the muscles of the tongue.

Ranula is usually presented to us as a round or oblong, or more rarely a flattish, smooth, soft, fluctuating tumour, which is occasionally bi-lobed. It projects over the middle line, so as to be equally developed upon both sides. Its surface is bluish or rosy, with small branching vessels, and it is semitransparent. The contents are most commonly glairy, like white of egg, but they may be thick and of different colours. Ranula grows slowly (rarely quickly), is indolent, and attracts at first little attention; but when it presses the tongue upwards, and impedes mastication and speech, it necessarily excites notice. It may attain a very considerable size, and may project as far as or beyond the teeth, which it displaces, and it may even erode the bones of the jaw by its pressure.

Occasionally it shows chiefly in the supra-hyoid region, projecting but little into the floor of the mouth; then pressure applied to the cervical portion makes the buccal part more prominent. Ranula has been said in rare cases to hang down in front of the neck even to the sternum, and to press injuriously upon the windpipe and the great blood-vessels of the neck.

By carefully examining the surface of a ranula, the opening of Wharton's duct may frequently be seen patent, when, if a fine probe can be passed beyond the tumour, or if, when salt or sugar is put upon the tongue, the saliva is seen to distil from the orifice, or if, by pressure, saliva can be made to exude, then we know that the tumour is not formed in the duct, but is unconnected with it. If these tests fail, and especially if a concretion can be felt in the passage, then we have probably to do with an obstructed and dilated duct.

*Fatty Tumours* are met with in the usual position of ranula; and in history and many of their external characters they may bear a close resemblance to the tumour above considered, especially as they have been seen with a cyst on their buccal surface; but in general, palpation will distinguish them; if not, an exploring needle, or an incision, which can here do no harm, will clear up the diagnosis.

In those rare cases in which the chief projection is towards the neck, the indolent, fluctuating character of the external growth; its position projecting above the hyoid bone; the effect of exploration by alternate pressure on the floor of the mouth and in the neck; and the unchanged colour of the skin, will enable us to diagnose it.

**RECTUM.**—A. **Piles.**—May be external (to sphincter) or internal. They are formed, for the most part, by a varicose dilatation of the hæmorrhoidal veins, which, from the want of valves, are especially apt to become over-distended. Sometimes, again, external piles consist of enlarged capillary vessels, somewhat like erectile tissue. Piles are most apt to occur, and to be much developed, in persons beyond middle life, whose habit of body or occupation leads to congestion of the hæmorrhoidal vessels. Anything in the general constitution, any abdominal, pelvic, or anal affection, any special habit or occupation which tends to impede the return of the venous blood from the rectum, or which induces arterial congestion, may occasion piles. It is in this way that torpor or disease of the liver, tumours in the pelvis, or abdomen (uterine or other), or rectum; constipation, and hardened fæces impacted in the bowel; enlarged prostate, stone, and stricture of the urethra (by the straining which they produce); long continuance in the erect posture; the abuse of drastic purgatives; and any affection of the anus which induces the determination of blood thereto, produce piles.

(*a*) *External piles* obtain their covering from the skin, or the skin and mucous membrane combined. They present themselves to us usually as folds of a thickened tissue, encircling the gut, or radiating from the anus as a centre. They may be flaccid, and give little annoyance, except causing heat and itching at times; or they may be highly irritating, especially if they become congested and inflamed; then they are seen to be tense and hot, and produce violent aching or shooting pain, not confined to the anus, but extending to neighbouring organs. If the patient is costive, he will suffer most severely after defecation. The piles then feel burning, and even sitting after stool may occasion much uneasiness.

Piles are occasionally the source of very profuse and exhausting hæmorrhage, which is only remediable by their removal. Sometimes by the rupture of one of the veins, and the escape of blood into the cellular tissue, and its subsequently becoming encysted there, a little solitary tumour is formed, and can be felt by the side of the gut.

The only affections with which external piles can be confounded are *venereal warts* and *condylomata*. The warty character of the former, the deep clefts between the different masses of which it is composed, and the profuse, irritating discharge which is present, are, however, quite distinctive. Condylomata at the anus, again, are flat, spread out (most usually), and soft; they have a granular strawberry-like surface; do not increase or diminish with the state of the bowel; are slow of growth; and are probably accompanied by other venereal symptoms on different parts of the body.

(*b*) *Internal piles* have their covering from the mucous membrane, which may or may not be changed in its structure. These piles may present themselves as long-shaped projections; but more commonly they form globular tumours, sometimes sessile, sometimes pedunculated, of various sizes, and almost always multiple. The blood is occasionally coagulated within them, so as to form a firm mass; but more commonly it remains fluid, so that they are soft, and can be greatly diminished in size by pressure. These piles enlarge or diminish according to the presence or the absence of those conditions which produce congestion.

The soft surface of internal piles is ordinarily regular and smooth, and the colour red or purple. They may, however, have an irregular granular surface, and the tissues composing and surrounding them may, by inflammatory deposit, be much changed in structure. Internal piles, if small, usually return without aid after protrusion at stool; but they may only be reducible by interference, or they may be irreducible. Occasionally the pile is constricted at its base, or at its centre, by the sphincter, so that half of the tumour is placed above and half below the muscle. Bleeding may attend internal piles, and occur either in small quantity or profusely. It may be arterial, or venous, or mixed. It is usually arterial, and consequently of a red colour; and is liquid when passed, unless it has been retained for some time within the bowel, when it may be evacuated in clots. The blood sometimes flows at all times. Sometimes it precedes, but more commonly it follows defecation alone, and streaks the fæces. At other times it accumulates in the gut, and bursts forth at intervals. Sometimes the bleeding appears only when there is constipation; in other instances it is periodic in its appearance, and may, in females, be vicarious of the catamenia.

As a result of the loss of blood, anæmia, palpitation, giddiness, shortness of breath, and general nervous debility, with derangement of the uterine and gastric functions, may appear, and be alone complained of and attract attention.

When such symptoms as those just referred to are present, the existence or not of piles should be ascertained.

The pain and irritation occasioned by internal piles varies considerably in different cases, and is by no means in proportion to the size of the hæmorrhoid. Usually the feeling of a foreign body being in the rectum, which protrudes after stool; the bearing down this gives rise to; the frequent desire to defecate, and the unsatisfactory feeling after it has been accomplished; the smarting after the passage; the pain shooting into the testicle and bladder, into the back, pelvis, and even down the limbs to the feet, are very distressing. The irritation of the bladder, too, accompanied by retention or incontinence of urine, may be so great as chiefly or solely to cause the patient to seek advice. The counter statement must not, however, be lost sight of, viz. that irritability, stricture, stone, enlarged prostate, &c., may be the *cause* of the piles.

The discharge of slimy mucus is also a common and an annoying symptom of piles. This discharge may occur only at stool; but in bad cases it flows on the least exertion or even movement.

Piles may cause constipation by their mechanical effects, or the opposite condition of incontinence may be due to them. In some cases, standing or walking is difficult or impossible when the piles are large and irritable.

Finally, by the finger, the pile, if not protruded, can be felt; and by the speculum ani they may generally be easily seen, unless, as is rarely the case, they are seated very high up in the bowel. The best mode of determining the presence of internal piles is to make the patient strain, as at stool, over a vessel containing hot water, and thus they will be brought down.

The parts around the anus in old cases become the seat of inflammation, abscess, and fistula; and they may remain hard, contracted, and thickened in structure.

Internal piles may be confounded with polypi, prolapsus of the mucous membrane of the rectum, and various affections of the bladder and uterus. The bleeding may be mistaken for that which sometimes escapes in scurvy, typhus, ulceration of the bowel, dysentery, and cancer; and it is to be remembered that external piles alone may be the cause of hæmorrhage, as may spasmodic contraction of the sphincter, without any piles at all.

*Polypi* are solitary, soft, pear-shaped, pedunculated, usually lobed bodies, larger than piles. They have a different history, and accompanying symptoms, than piles. They grow slower, are paler in colour and smoother on their surface; seldom bleed much, and if they bleed it is after stool, and not periodically, as piles so frequently do. Polypi are firmer than piles, do not undergo augmentation and diminution in accordance with the congestion of the part. By the finger and speculum, their size, pedunculated character, solitariness, and point of attachment can be made out. Polypi, too, usually occur in the young; piles rarely so—so rarely that if a young child is losing blood per anum we may almost be certain that there is a polypus present in the gut.

*True prolapsus of the mucous membrane* of the bowel is continuous all round. It surrounds the anus, or it occurs in flaps which are broad at their base. There is seldom bleeding in any way so profuse as occurs in piles; there is no alternation of fulness and emptiness; the folds of the membrane may be slid on one another; and none of the other symptoms which have been described as distinctive of piles are observed.

*Affections of the uterus and bladder* are distinguished from piles by their appropriate signs.

The flux which occurs in piles is recognized by the blood being fluid, and usually red, streaking the fæces, and not coagulated or mixed with the motion. The existence of the tumours, too, and the presence of the other symptoms of piles, together with the absence of all evidence of those other diseases on which bleeding might depend, and which were enumerated above, will fulfil the diagnosis.

In examining the rectum, the patient may be made to bend over a chair with the limbs slightly apart, or be laid on the side with the thighs bent on the body. The finger being well greased, and its nail filled with soap, is slowly and gently inserted, and the interior of the bowel carefully explored.

**B. Prolapsus of the Mucous Membrane.**—This may occur only after stool, or after violent exercise, or it may appear in severe cases merely from the maintenance of the erect posture. It may arise from the dragging effect of piles, polypi, &c., or by their causing straining at stool. So, too, enlarged prostate, calculus, stricture, displaced uterus, pelvic tumours, frequent child-bearing, may be the exciting cause. It may be due to mere relaxation or want of due tone in the sphincter or levator ani. It is most common in children of feeble habit of body, and between one and four years of age. It may be excited by worms or other irritation in the rectum, derangement of the digestive organs, &c. In adults it may arise from mere feebleness and relaxation, as that produced by long residence in tropical climates. It is in persons of a lymphatic temperament that it is most common. Over-action of the bowels, whether caused by chronic dysentery or diarrhœa, or the abuse of drastic purgatives, may also cause it. Constipation and diarrhœa alternating are very apt to produce it.

In children prolapsus may apparently be due to phymosis, inflammation of the glans penis with adherent prepuce, or to whooping-cough.

Prolapsus of the mucous membrane forms a red, elastic, turgid, coiled ring round the anus; or it may present the appearance of two red, lateral, semicircular folds of membrane protruding at the anus. It causes a dragging sensation, irritability of the bladder, and sometimes symptoms which may be mistaken for stricture of the urethra. It produces great discomfort, and the pain constrains the movements, and gives rise to much mental annoyance. The mucous membrane is continuous with that covering the sphincter. When long protruded, the membrane gets thickened, granular, and sometimes ulcerated from friction. It may bleed freely at times, or continuously in small quantities, so as greatly to weaken the patient, and to render him anæmic. It may constantly exude a fœtid discharge of mucus and blood. The skin around often presents radiated folds, the plaits of which may be much irritated.

If the whole thickness of the gut is protruded, and not merely the mucous membrane, a deep sulcus will be found between the sphincter and the protruded mass, into which the finger can be inserted, and the mucous membrane of both is not continuous. The protrusion will form a thick, bright red or livid (according to the amount of constriction), congested, and swollen mass, presenting a slit at its centre, where the anus lies.

Prolapsus is to be distinguished from piles, polypi, and condylomata (see pp. 388, 391).

When large, the protrusion assumes a pyriform shape, with a rugous surface, and in the male protrudes straight out; but in the female, from the closer connection of the anterior portion, than the posterior, with the vaginal septum, and the consequent freer protrusion of the latter than the former part, in them, the prolapsus is curved forwards. If the rectum is largely invaginated, and the accident has occurred suddenly, there will probably be violent colic, vomiting, and much irritation of the urinary organs, which symptoms will not attend (or only in a very modified degree) simple protrusion of the mucous membrane.

If the strangulation is severe, and not relieved, gangrene may set in and destroy the part of the bowel prolapsed.

C. **Polypus.**—This growth is more common in the rectum than in any other part of the intestinal tube. It may be hard (fibrous), or soft (fibro-cellular). The former is chiefly met with in adults, and the latter in the young, who are most liable to the affection. They are generally single, rarely multiple. They vary in size from a hazel-nut to a hen's egg, and are pear-shaped or globular. Their usual point of implantation is about three inches from the verge of the anus. They are usually pedunculated, and have a long and slender stem; but they may also have a broad base, and hang but a little way down from their place of attachment. When connected to the parietes of the gut by a slender stem, they are very loose and floating. They grow slowly, and cause inconvenience chiefly by their mechanical effects. They render defecation difficult and painful, and may produce vesical irritation also. They occasionally come to project at stool, and even during the intervals of defecation. When they protrude they cause a feeling (which is, however, generally always present in a less degree) of there being a foreign body in the bowel—a sensation which gives rise to much straining and annoyance. When a polypus is protruded it may be grasped and even strangulated by the sphincter.

Polypi are recognized by their shape, their solitary character, and freedom (usually) in the bowel; by their slow growth, and want of pernicious influence on the general health, unless they are attended with much bleeding; by their usually causing little pain, and not usually violent hæmorrhage at a time (though to this there are sometimes striking exceptions); and by the slight discharge of rose-coloured or gray slime which accompanies them. In young children the bleeding may be pretty severe, and is the symptom which usually attracts notice. The frequent occurrence of hæmorrhage with the stool of young children is almost certain to be due to a polypus. In them the hæmorrhage may produce, from its constant recurrence, more than its actual amount at any one time, very serious effects; and a pale, anæmic, unhealthy look, due to the loss of blood, will be marked. The finger can define the shape, smooth surface, and free-floating condition of these tumours within the bowel. Touching or pressing them, so long as the stem is not drawn on, causes little pain; and by the eye unaided, or by the use of the speculum, they can be seen. When they protrude at the anus they may have the appearance of a cherry or a strawberry, with a smooth, or it may be a granular surface, and occasionally an ulcerated spot. In some cases when the fæces are consistent, a groove or indentation on their surface is caused by the polypus.

Sometimes a very vascular sessile growth, which is improperly termed polypus, is met with in the rectum, connected with the mucous membrane alone. This is soft and velvety, and bleeds profusely when touched. The distinction between polypi and piles is given at page 391, and that between them and prolapsus at page 392.

**D. Cancer of the Rectum.**—May be hard or soft, melanotic (very rare), colloid, or epithelial. All these forms are rare in this region, except hard cancer, which is not an uncommon affection as a primary disease, and confined to the rectum. It is rare as a secondary disease. Colloid is sometimes combined with scirrhus. Scirrhus is comparatively chronic, and slow in its progress. Encephaloid cancer is rapid, and may attain a great size; other growths of the same kind will usually be found elsewhere, and the constitution is rapidly contaminated. Epithelial cancer is of slow growth; it spreads upwards from the anus; its surface is ulcerated and irregular; the sores have hard elevated edges; the constitution is slowly and at a late period affected; there is no contraction of the calibre of the bowel, and it causes little pain—defecation being generally attended with only slight suffering, as compared with what is endured in other forms of cancer of this part. The microscope will moreover demonstrate the nature of the disease if a small portion of the tumour can be procured.

Malignant disease is a very rare affection in the rectum of young persons.

Scirrhus of the rectum may present itself to us in the form of infiltration, or as distinct masses, in the walls of the bowel, superficial to or beneath the mucous membrane. It occurs by preference at either end of the rectum, and is especially common near the anus. It is usually annular, the vertical extent varying from a very narrow band to a broad zone of some inches. From the mode in which a scirrhous tumour soon forms adhesions to, and draws together the neighbouring parts, and the concentric contraction of the growth itself, the calibre of the bowel is rapidly diminished, till the passage is almost or entirely obliterated. Above where the bowel is thus contracted the gut is very commonly enlarged and thickened. Abscesses form round the anus in many cases, and fistulous openings may exist there, or in communication with the bladder, urethra, uterus, vagina, &c., by which flatus and fæces pass, and cause much injury.

The symptoms of malignant disease of the rectum are those referable to a mechanical difficulty in voiding the fæces, together with pain in the part, derangement in the digestive organs, and general constitutional impoisonment. The difficulty of evacuating the bowel may set in before there is any actual stricture established, from the rectum having lost its contracting power, in consequence of its being infiltrated with the disease. The pain, particularly when the bowel acts, is usually very violent, and of a burning, boring character. This lasts long after the act is completed, and causes the utmost apprehension. The pain extends round the pelvis, and into the back and thighs. In rare cases this violent pain is absent. The difficulty of evacuating the bowels augments; and when ulceration is established, or when the sphincter is implicated, incontinence may occur, and add, if possible, to the patient's sufferings. There is an abiding feeling of a foreign body being in the bowel, and a desire to evacuate the slimy discharge which remains in the rectum. If the fæces are consistent, and the disease not high in the gut, they may be moulded and marked by the constriction or nodules of the disease, so as to be flattened or grooved; but this appearance is frequently absent, as when the disease is placed high in the bowel, a remoulding of the fæces may take place lower down; and, moreover, the appearance referred to may be entirely due to spasmodic contraction of the sphincter, independently of all contraction. Bloody slime, of a most fœtid smell, flows abundantly from the anus when ulceration has broken the surface of the cancer, and debris of cancer tissue may be found mingled with the evacuations. The digestion suffers greatly. Flatulent distension occurs, and the general health ultimately gives way from the pain, the deficient nutrition, the drain of the discharge, and the direct influence of the cancerous affection upon the constitution. When advanced, the disease leaves its impress upon the face and whole body.

We may employ the speculum, bougie, and injections, to determine more accurately the condition and extent of the disease.

By *palpation and percussion* we can find the tumour when it lies high in the rectum; and the accumulation of fæces, together with the flatulent distension, can in the same way be recognized.

By the *finger*, if the disease is near the anus, we can discover the rough, irregular, hard or friable and easily broken down surface of the growth. The constriction it causes; its position upon one side of the bowel, or all round the gut; and the pain and bleeding such touch gives rise to, will further aid us. If the cancer is at a certain height, we cannot reach it by the ordinary mode of digital exploration; but if we make an assistant press the elbow, so as to cause the finger to penetrate deeper, and at the same time make pressure upon the abdomen downwards towards the pelvis, a great extent of the rectum can be examined.

The *speculum* is seldom of much service in these cases. It gives much pain, and does not reach far enough. If, however, the disease be on one side of the bowel, and not far distant from the anus, then it will be of use.

*A bougie* will determine the seat of the constriction and its extent. Bougies of wax, in some few cases, and by great care, may be got to retain the impression of the constriction; but in withdrawing the instrument the impression is frequently lost.

*Injections* penetrate with difficulty, and if there is a contraction, they return very slowly and mixed with bloody slime and debris.

In any doubtful case, the neighbouring passages should be examined—the vagina in the female, and the urethra in the male. Ulceration and perforation into the rectum, produced by uterine pessaries, has allowed the finger and instruments to pass into the cavity of the uterus, and so cause an error in diagnosis when an examination of the rectum was being made in a suspected case; but this is not likely again to occur; nor is a fistulous communication with the bladder, urethra, or vagina, likely to be mistaken for a contracted bowel. Again, it would imply extraordinary carelessness to mistake the soft, bleeding masses of internal piles, which undergo augmentation and diminution according to the state of the bowel and the congestion of the parts; or the solitary, pear-shaped, pedunculated, and reducible polypus of the rectum, which but little affects the general health, for cancer in any of its stages.

*Tumours* pressing on the rectum, growing in its walls (fibrous, cystic, fatty, steatomatous), or in the pelvis, or bladder, or prostate, or uterus, or ovary, or dislocation of the uterus, or stricture of the rectum from inflammatory action, could only cause one of the symptoms of cancer, viz. a difficulty in defecation; but the other features of the disease would be wanting. Besides, an examination by the anus would explain many of these sources of error. If the vagina, uterus, urethra, and bladder are explored, there should be no mistake committed.

The hard or soft friable condition of the tissues at the seat of constriction—the appearance of the ulcerated surface, if it can be reached by the speculum—the character of the discharge—the vegetations from the walls of the bowel below—will all differentiate simple stricture or ulceration of the bowel from malignant disease.

Syphilitic sores, again, lie near the anus; they have a different appearance, and do not ulcerate nor bleed like cancer. They are accompanied by condylomata and fissures, and an irritating purulent discharge. They are curable by local and general anti-syphilitic treatment, and there will probably be constitutional indication of the disease elsewhere.

E. **Stricture.**—May be simple or malignant. The symptoms of the latter have been already detailed. Simple stricture may arise from chronic thickening or deposition in the tissues of the bowel; and while it is said to occur at any part of the rectum, it is certainly most frequently met with from two to three inches above the anus. It may also arise from the cicatrization of syphilitic sores, and the inflammation of the mucous membrane which attends gonorrhœal infection. When caused by venereal disease, it is a primary symptom and is placed low down, and is accompanied by condylomata, purulent discharge, and other symptoms of the disease on which it depends. Simple stricture from hypertrophy is most common in middle life, and is slow and chronic in its establishment. It may be caused by a mere band round the gut, or the vertical extent of the contracted portion may be considerable. Rarely it is unilateral. More commonly it is annular.

To symptoms of constipation follow an increasing difficulty in defecation, which is usually some time of attracting attention, and is only by slow degrees found not to respond to the usual remedies. Symptoms of indigestion, colic, flatulent distension coming and going, loss of appetite, &c., attend the outset of the disease. The difficulty of evacuating the bowel causes straining, and thus piles and hernia may be produced. There is pain after such efforts, continuing for some time, and passing up into the back, round the pelvis, and even down the thighs. There is frequent desire to go to stool, and the evacuation, when obtained, is unsatisfactory. Diarrhœa, in which the fluid fæces are passed, alternates with obstinate constipation, and the diarrhœa may continue so long as to be the immediate occasion for calling in professional aid. The motions may, in some cases when the stricture is low down, exhibit evidence of the narrow or irregular passage they have passed through, being twisted, curved, or flattened. This, however, it is to be remembered, may be entirely due to an irregular contraction of the sphincter. Sometimes the feculent matter is expelled in little balls, and glairy mucus may escape with the fæces, and also between the acts of defecation. When the stricture becomes complete, retention of fæces sets in, with the train of symptoms given at p. 326.

Abscesses in the neighbourhood of the rectum, resulting in fistulous passages, are not unfrequent in stricture. The bladder may become irritable, and retention result. In the female, a bearing down of the womb is not an uncommon symptom, and a most annoying itching and irritation about the anus is not an unusual early accompaniment of stricture. Percussion and palpation discover the accumulation of fæcal matter in the left iliac fossa, and the distension of the gut by gas above may be, in the same manner, determined. The rectum, in these cases, is frequently found distended with gas. The bowel, above the seat of constriction, gets greatly dilated, thickened, and eroded, and may become paralyzed; while below, it is also frequently enlarged (if the stricture is high up), and weak, its mucous membrane is ulcerated, and presents numerous rough, red projections, resulting from irritation and inflammation.

If within reach of the finger pushed high up, with or without such assistance as was referred to when speaking of the examination of cancer, the character, and possibly the extent, of the stricture may be determined; or the speculum may enable us to see it if it is placed low down; or a bougie may be employed to examine it. The method of determining the length of the stricture recommended by Laugier is ingenious, and might be useful in some cases. A hollow elastic bougie is passed through the stricture, having a small bag of goldbeaters' leaf attached to its extremity. When the end with the sac attached has passed the stricture, the bag is inflated through the bougie and traction is made, while the air is prevented from escaping by closing the external end of the bougie. By subtracting the distance which is ascertained to exist between the anus and the lower end of the stricture from that which is marked on the instrument which was passed beyond, the length of the strictured portion can be ascertained.

A soft wax bougie, though obtaining the impression of the stricture, will most probably lose it on being withdrawn. In introducing the common rectal bougie of a size which is found to pass, the sensation communicated to the hand will give us considerable information as to the tightness of the stricture, its distance from the anus, the roughness or evenness (ulceration, bands, &c.) of its surface, the direction of the canal, &c. It may be here noted that the bougie, unless it is properly and carefully guided, may be arrested by the prostate, diseased bladder, retroverted womb, the prominence of the sacrum, hardened fæces, the folds of the bowel, and tumours of the pelvis, and thus the surgeon deceived with regard to the presence of a stricture of the bowel; and, it is further to be remarked, that the symptoms of stricture have been closely simulated by the impaction of an ovarian tumour between the bladder and rectum.

Injections, by the facility with which they pass and return, together with the existence or not in the fluid as it returns of blood, pus, &c., will also add to our information.

In simple stricture of the rectum, the general health ultimately gives way, though it is long unaffected, and a haggard appearance, which might easily be mistaken for the cachexia of cancer, is observed.

At p. 398, the distinction between simple and malignant stricture is given.

F. **Neuralgic Affection** of the rectum.—There is usually some lesion (fissure, ulcer, stricture), although difficult to find, which was the starting-point of the malady, and keeps it up; but occasionally, in weak, excitable persons, no explanation in the condition of the gut or in the nature of the fæcal excretion can be found to explain the violent pain existing, either at a spot in the rectum (which on examination may or may not be found hypervascular), or which pervades this entire portion of the bowel. The pain is usually paroxysmal, with considerable intervals between the attacks. It is generally most severe, extending to the surrounding parts, and causing irritation of the bladder, and frequent and uncontrollable efforts to defecate at irregular and inappropriate times. Such an affection may declare its neuralgic origin still more clearly by alternating with similar pains in other parts or organs. It may depend on deranged digestion, irritation in neighbouring parts, as the bladder, prostate, and urethra (stricture), uterus, or ovary (displacement of the former), deranged catamenia, &c. It is sometimes said to arise from miasmatic influences.

The due recognition of this affection is not difficult, as, with the symptoms above stated, we fail, by a careful examination of the rectum and neighbouring organs, to find any other explanation of the phenomena than one or other of those stated above.

**SACRO-ILIAC DISEASE.**—This is a rare malady. It is a strumous chronic affection of the sacro-iliac articulation, which may, if its features are not known, be confounded with hip-joint disease, caries of the spine, and other affections of the neighbourhood.

Pain is usually the earliest symptom of the disease. Its seat is at first not well determined. It is referred to the sacrum and lower part of the back, and is often supposed to be rheumatic, especially as it is frequently aggravated at night. It is not in the first instance continuous, but soon becomes so, and gradually concentrates itself at or about the affected articulation, extending round into the groin, and in rare cases down the thigh. Pressure over the articulation, and all movements in the joint, either transmitted from the lower limb, as in walking or standing, or in movements communicated by pressure applied to the crest of the ilium, augment the pain; but if the pelvis is fixed, and thus the transmission of the motion arrested, the limb may be moved in all directions without causing any uneasiness.

The pain gets very severe, and a feeling of looseness and want of due consolidation and firmness in the articulation accompanies it. The patient cannot lie on the affected side; and when he stands, he leans on the sound limb, and keeps the knee of the affected side slightly bent and abducted, while the toes are held straight out or are slightly everted. He is lame, and bends forwards in progression, requiring the help of a staff. The limb on the affected side is wasted, and is elongated from the outset, and it is at no stage shortened. This elongation is due to a change at the affected joint, and not to anything at the hip or knee. By measuring from the anterior superior spinous processes on either side, it can be shown that the two limbs are, *in themselves*, of equal length, and the elongation lies above the hip at the sacro-iliac articulation; so that by measuring from the spinal column only can the difference be made apparent. The anterior superior spinous process is more prominent on the affected than on the sound side, as may be seen by carefully putting the spine and pelvis straight; and it arises from the separation and distension of the sacro-iliac joint, by which the ilium is pushed forwards and rotated downwards.

Puffy swelling (eventuating late in the disease in fluctuation, if abscess forms) is found over and in the direction of the articulation. Pus forms only late in the disease, and may point in various places above the joint (in the loins), or below in the gluteal region. The matter may pass into the pelvis, and again come out through one of its inferior apertures. It may burst into the rectum, or point at the side of the anus, or it may come forward and approach the surface in the groin. These abscesses are slow of forming and making their way to the surface. The hip gets ultimately flattened, and the folds between it and the thigh depressed.

It is with disease of the *hip-joint*, undoubtedly, that sacro iliac disease is most apt to be confounded; but the deformity is not the same when carefully studied.

The lower and more prominent position of the anterior superior spinous process is permanent, and not depending on any obliquity of the pelvis or spine; and it is not remediable by position, as it is in hip-disease. The limb is lengthened by changes *above* the hip in the one, and by changes *in* the hip in the other. In hip-disease, the limb becomes ultimately shortened, which it never is in sacro-iliac disease. Further, the pain on pressure in sacro-iliac disease is over the line of that articulation, and diminishes as we pass away from it. Percussing the trochanter, or pressing deeply behind it or in the groin, does not augment the pain, as in hip-disease. Rotating the thigh outwards, adducting and abducting it, gives no pain, if the pelvis is fixed, in the one; but causes much suffering in the other, however we treat the pelvis.

From *carious disease of the spine*, sacro-iliac disease is distinguished by the tenderness on percussion over the affected vertebra in the former affection; by the distortion (excurvation) nearly always present; by the younger age at which spinal disease usually appears; by the stiffness or diminished mobility of the spinal column; by the unaffected state of the limb as to length, and the anterior superior spinous process as to position; and by the absence of tenderness over the sacro-iliac articulation. Abscesses connected with both maladies may, however, occupy similar positions.

In *sciatica*, the patient is usually beyond middle life, the pain is severe and acute from the outset; it passes down the limb in the line of the nerve, and is not confined to the pelvis. The limb is not lengthened; the anterior superior spinous process is not displaced; and there is no swelling or tenderness over the sacro-iliac joint; and finally, the history of the two cases is quite different.

*Disease of the bones of the pelvis* may eventuate in abscess; but when the pus is evacuated, the probe discovers the bare bone, which is rarely near the sacro-iliac joint. The ilium is not displaced or the limb elongated.

*Neuralgia of the hip*, again, is a nervous affection of hysterical females, whose disposition will be manifested in other ways. The pain is very violent, superficial, and wide-spread. It is not confined to the sacro-iliac articulation, where, too, there is no swelling or threatened abscess. There is no alteration in the position of the ilium, or in the length of the limb, if all obliquity of the pelvis and the spine is corrected.

**SCROTUM** is liable to hypertrophy, which when excessive takes the name of *elephantiasis*. It is chiefly in tropical countries that this is met with, and but rarely in Great Britain. Situated in the scrotum, no affection of the testicle can be well confounded with it.

Encephaloid disease attains a great size, but nothing to be compared to elephantiasis; while the general health will be so deeply involved when the cancer has attained any bulk as to remove all obscurity in the diagnosis. In truth, death will usually occur before an encephaloid tumour attains a size equal to that frequently presented by elephantiasis which has not yet come to affect the general health, and only causes annoyance by its bulk.

*Fibrous and fibro-cellular tumours* occasionally, but rarely, occur in the scrotum, and attain a great size. They declare themselves by those general features in history and physical characters which mark such tumours in other parts of the body.

*Fatty tumours* are very rare in this part; while *cysts* are occasionally met with, having fluid contents only, or calculous deposits as well. In very rare cases fœtal tissues ("monstrosity by inclusion," and then congenital), hair, bones, teeth, &c., are found in the scrotum. Concretions of carbonate and phosphates of lime occur rarely beneath the skin in the scrotum when it is hypertrophied. The knowledge of the occasional occurrence of these various maladies will, in the rare cases in which they are presented to us, enable us to recognize them.

**Epithelial Cancer** ("chimney-sweeper's cancer") attacks the scrotum, beginning below as a wart or fissure, and slowly invading the bag, the testicles, and the cord. It is in men between thirty and forty years of age that this disease is most common. The sore is an irritable, dirty one, with raised, everted edges, and gives out a thin irritating discharge. The glands in the groin enlarge; and ultimately the constitution, which for long resists the infection, gives way.

There are numerous chronic tumours met with in the scrotum, and the recognition of them is frequently difficult. This arises partly from the fact that several of them may be combined, and partly from the way in which their leading features may be obscured.

A certain number of these tumours are partially or wholly reducible into the cavity of the abdomen; others are irreducible, and this fact forms a broad groundwork of distinction between them.

A. The following are reducible, more or less completely, when the patient is in the recumbent posture.

(*a*) Hernia; (*b*) congenital hydrocele; (*c*) diffuse hydrocele of the cord; (*d*) varicocele.

For the characters of these affections, see respectively pp. 295, 322, 284, and 176.

In the examination of the above tumours, we have chiefly to observe their mode of reduction and reappearance afterwards.

B. The following are irreducible:

(*a*) Hernia; (*b*) hydrocele of the tunica vaginalis; (*c*) hematocele of the tunica vaginalis; (*d*) simple tumours of the testicle; (*e*) malignant growths of the testicle.

Some of these are soft (hernia) or even fluctuant (hydrocele, hematocele at its outset, soft cancer at parts); and some are solid, as the various forms of sarcocele.

In examining these tumours we observe—

(1) The history of their rise and progress.
(2) Their connection with and relation to the testicle.
(3) Their consistence.
(4) Their surface, whether regular or not.
(5) Their shape and size.
(6) Their transparence.
(7) Their specific gravity.

**(8) Their sensibility.**
**(9) The state of the overlying skin.**
**(10) The effects of percussion.**

**(a) Irreducible hernia—**
- **(1) Probably reducible at one time. Has come down from above. There is deranged digestion, borborygmi, &c.**
- **(2) Testicle clear of the sac—it lies behind, and is unaffected.**
- **(3) Irregular doughy feeling, varying, however, with its contents.**
- **(4) Surface irregular and knobby.**
- **(5) Flask-shaped, and of varying size.**
- **(6) Opaque.**
- **(7) Not great weight; dense, but not heavy.**
- **(8) Indolent, or only slightly sensitive.**
- **(9) Skin unchanged and free.**
- **(10) Clear when percussed laterally, if it contains bowel; and dull if it contains omentum.**

**Add that there is an impulse on coughing.**

(*b*) Hydrocele of the tunica vaginalis.
- (1) Forms slowly from below upwards, without any abdominal irritation.
- (2) Testicle behind and slightly external, or enveloped and seen by transmitted light, or defined by pressure.
- (3) Fluctuant unless the sac is much distended.
- (4) Regular and smooth.
- (5) Pyramidal, with the apex at or towards the ring.
- (6) Transparent unless sac very thick.
- (7) Light.
- (8) Indolent on pressure.
- (9) Skin free and unaffected.
- (10) Dull ("humoral") on percussion.

(*c*) Hematocele of the tunica vaginalis.
- (1) Forms rapidly if traumatic, and slowly if spontaneous. Fills from below upwards. Usually after injury.
- (2) Testicle enveloped by it. Cord free above.

(3) At first fluctuant, afterwards semi-fluid and elastic or firm. Same consistence throughout.
(4) Regular and smooth or bossy.
(5) Globular or pyramidal, the large end being downwards. Size varies from a hen's egg to the head of an adult.
(6) Opaque.
(7) Heavier than hydrocele, but not nearly so much so as a solid tumour.
(8) Occasionally very painful, but if of some standing it is indolent.
(9) Is traumatic, skin often violet—ecchymosed.
(10) Dull on percussion.

Add that there is no impulse on coughing, and that not unfrequently, if seen early, there is a crisp sensation communicated to the hand when it is pressed.

(*d*) Simple sarcocele.
(1) Growth slow. Tubercular disease of the testis begins in the epididymis; and in syphilitic disease we have the previous and accompanying symptoms of the local and constitutional affection.
(2) In syphilitic and tubercular sarcocele, both testicles are usually affected, and the gland is involved in the mass.
(3) Consistence varies. Generally firm or hard, but occasionally there may be soft or elastic spots found on its surface; or it may be hard at first and afterwards soften.
(4) Usually irregular.
(5) Globular, or oval, or irregular.
(6) Opaque.
(7) Generally heavy.
(8) Sometimes very painful, at other times indolent. The venereal testicle is often painful at night.
(9) In tubercular disease the skin gets implicated, and abscesses and fistulous openings form. If the tumour is large, the skin becomes stretched and thin.
(10) Dull on percussion.

(*e*) Malignant disease. Soft cancer.

- (1) Confined to one gland usually. Begins in the testicle, and extends to the epididymis and cord. Rapid and constant growth.
- (2) Testicle involved in the mass.
- (3) Soft, even almost fluctuant, at some places, and hard at others. Tense. Fluctuation, if accompanied by effusion into the tunica vaginalis.
- (4) Bossy.
- (5) Shape of gland retained till the tunica albuginea bursts.
- (6) Opaque.
- (7) Heavy.
- (8) Occasionally indolent, but often after a time there is a hot, remitting, darting pain passing up the cord.
- (9) Becomes adherent to the skin, which stretches and bursts.
- (10) Dull on percussion.

Add that the cachexia is usually marked; that the lumbar glands become affected; that similar growths often appear in other parts; and that when the skin gives way, a bleeding fungous protrusion takes place, which is very characteristic.

See further on the diagnosis of simple and malignant sarcocele, under TESTICLE.

**SKULL**, FRACTURES OF.—May be seated in the vault or in the base. May be either caused by direct or indirect violence. Fractures in the vault usually result from direct, and those at the base from indirect violence. The effects produced on the brain within by the shock, by extravasation of the blood, by the pressure of displaced fragments, or the products of inflammatory action, are the most important and distinctive of injury of the skull. It is not, however, to these rational or vital symptoms that reference is here to be made, but to the physical signs which mark the accident—the reader being referred to the article BRAIN.

It is always important, in fracture of the skull, to get as clear an account as possible of the accident, of the wounding weapon, of the direction in which the blow came, its force, &c. In falls, too, an idea should if possible be formed of the amount of violence likely to have been sustained. These points are often useful; but they cannot do more than supply a slight assistance in forming an opinion of the case, as it is well known that a feeble blow may in one instance produce physical effects a severe fall or blow may fail to cause in another. Further, we should learn if possible the exact part of the head struck, and the direction of the blow, as thus a hint may be obtained in obscure cases with regard to where the fracture is situated.

The fracture may be a mere fissure or linear breach of continuity, without any separation of the fragments. These fissures may diverge from one spot, and pass far through the bones. There may be wide and extensive disjunction of the fragments, accompanied by displacement inwards or outwards; or there may be comminution of the bone into small particles.

Again, the external table alone may, in those parts of the vault where the diploë is thick, or where there are cavities between the tables (as at the frontal and mastoid sinuses), be fractured and displaced without the inner table suffering. The inner table may be extensively fractured while the external is little injured, as when a pointed agent is driven through the external table, and acts widely upon the inner. Nay, further, in some rare cases the inner table has been fractured by *contre-coup*, while the outer remained entire; but the recognition of such a condition, though it may be suspected, can only be substantiated after death.

Fragments depressed on the brain may be of many different shapes and sizes, and so capable of producing very different effects. They may present a smooth surface towards the brain, or long pointed projections driven deeply into its substance. It is most common to find the edge of a fragment more or less sunk on the brain, and thus compression may result with or without laceration. The depression of bone may be great in some cases, especially in the upper and anterior part of the head, and yet little or no disturbance result. In general, however, the symptoms of compression are proportioned to the degree of depression and the importance of the part of the brain below. In fracture by indirect violence there is never depression of fragments, and the compression is due to extravasation of blood or inflammatory products.

If no wound exists, a simple fissure cannot be recognized. If there is a wound, we may detect it by the nail of the finger, or the point of a probe, or observing the capillary line into which the blood sinks. A suture, or a Wormian bone, have been mistaken for such a fissure. It is when the suture takes an abnormal direction that this mistake is most apt to be made; but the serrated appearance of the suture differs manifestly from the even lines of a fissure.

When there is no wound, it is frequently very difficult to distinguish clearly a fracture of the skull, unless there is considerable comminution or displacement of the fragments. If the fracture lie under the temporal muscle it may be so masked as to escape detection, even when it is extensive and comminuted. The old plan of Hippocrates, of putting the fibres of the muscle into action, is not now employed to define fracture of the cranial bones. Extensive effusions of blood may also mask a fracture.

Further, it is to be remembered that the deformity present may be congenital; or the result of an old injury; or it may depend on the partial absorption of the diploë, which is occasionally seen in the old, with consequent sinking of the bone; or it may be the external table alone which is broken or depressed; or it may be an effusion of blood on the surface of the bone, presenting a soft, depressible centre (where the tissues have been compressed by the blow), which gives before the finger like a movable and depressed fragment. In this last case, the hard edges sometimes closely simulate the margins of a hole in the bone; and if a considerable vessel has been torn, there may be a throb observed, which is apt to be mistaken for the beat of the brain. The distinction is made by observing—

(1) That although the finger appears to sink deeply at the central point, it never passes beyond the real level of the bone, and that the finger can, when so pressed down, feel the surface of the bone at its normal level.

(2) That pressure on the edges dissipates them, and allows the bones below to be felt. The edge or rim, moreover, was at first above the level of the bone, and not on the same level as it would be if we had had to deal with an aperture in the bone.

(3) It is impossible, thus, in mere fracture, to feel the pulsation of the brain if there is no bone removed.

(4) There are no signs of compression.

The patient complaining of pain, increased by pressure, at a fixed spot (especially if at a point opposite to that struck); or if insensible, his carrying his hand constantly to such a part, has been looked on by some as indicating the place of lesion; but while it is true, that in many cases reliable evidence is thus afforded, it is nevertheless certain that such signs are often quite deceptive.

If there is a wound, then we can have no difficulty in determining the state of things, in so far as the mere existence of fracture (especially if comminuted or attended by displacement of fragments) is concerned; but how far the brain may have suffered is often far from being easily determined by an examination of the fracture alone. The size, direction, shape, amount of depression, &c., of the fragments will enable us to form a tolerable guess, and the escape of brain matter would tell still more. The discharge, too, of cerebro-spinal fluid in abundance would also indicate deep injury of the brain; yet, it is to be noted, that in fracture of the fore part of the head, the escape of the inspissated secretion of the frontal sinuses has been mistaken for cerebral substance.

Fractures of the *base of the skull* are well known to be very fatal. These fractures are almost always the result of indirect violence; yet weapons thrust in by one of the apertures of the skull, or the condyle of the lower jaw being forced upwards, may, by direct violence, occasion fracture at this part of the head. There may be most extensive fracture of the base of the skull, and yet no immediate symptoms of the occurrence; but usually the effects are early and profoundly manifested. The important parts lying at the base of the brain, the great nerves which there arise, and the large supply of blood-vessels, render the lesion almost certainly fatal when the fracture is extensive. Fracture of the base may result from indirect violence differently applied. Falls or blows on the vertex, forehead, or back of the head—falls on the feet or the knees, or the perineum, may cause it, as may compression of the head in different directions.

The part fractured is in most cases determined by the point struck; and if we were thoroughly acquainted with the force and direction of the blow, together with the line of bone by which the forces were in each case transmitted, and the parts which are weakest, and consequently most liable to give way, we could determine, "*a priori*," where the fracture would be found. Aran has shown how, in fracture of the base, a line or fissure may be traced from the place on which the blow was struck, and how the seat of the fracture is determined by the section of the skull which has been submitted to violence. Blows on the forehead are usually followed by fracture in the anterior fossa; violence to the vertex is followed by fracture in the middle fossa; and blows on the back of the head are attended with fracture in the posterior fossa of the skull. Such a linear fracture as is here referred to, is not, however, in all cases to be found; but that the seat of fracture corresponds to the part of the vertex struck, is usually strictly true; and from the intermediate position of the middle fossa between the anterior and posterior, we have an explanation of the much greater frequency of fracture there.

The signs indicative of fracture of the base of the skull are often most obscure. The escape of brain matter, hæmorrhage (from laceration of some of the blood-vessels), and the discharge of cerebro-spinal fluid by one of the outlets, are the signs which are most confidently taken to mean fracture of the base, combined of course with those vital symptoms which may occur in all brain injuries, and such functional derangement of the cranial nerves as may arise from their laceration or compression.

In fracture of the base, blood may escape into the orbit; it may flow by the nostrils, mouth, and ear; it may be effused over the mastoid process, or the occipital bone, or appear at the back of the pharynx, or take place into the tissues of the neck. It is in fractures of the orbital plates of the frontal and sphenoid bones that blood gets most readily into the orbit; and while it may appear in rare cases in fracture of the malar or superior maxillary bones, yet when, with head symptoms, and after such a blow as would occasion fracture, we have effusion on the second or third day below the ocular conjunctiva, passing backwards into the orbit beyond our limit of search, there is every reason to suppose that we have a fracture of the fore part of the base of the skull to deal with. The effusion also extends under the lining of the eyelids, and is more frequent in the lower than in the upper lid; or, if in both, it is usually earlier seen in the former. There is no bruising of the skin of the eyelids as in ecchymosis, following blows upon the lids themselves; but the blood shines through the uninjured skin, and in this way discolours them. Such effusion into the orbit or eyelids does not necessarily attend a fracture of the fore part of the base of the skull; but when present, it is a most valuable indication of its occurrence.

Bleeding by the nose may be due to mere laceration of its lining membrane, and the blood so escaping may be swallowed, and afterwards ejected by vomiting or passed by stool. It is only when the bleeding by the nose and mouth is severe and prolonged, in a case in which injury to the base of the skull is suspected, that it would imply fracture of the bone at that part. The author once witnessed an accident in which the wheel of a loaded cart went over a man's head, and fractured the base of the skull obliquely from one side to the other, the basilar process of the occipital bone being broken across. The patient spoke a few words quite sensibly, rose to his feet, as arterial blood poured from his mouth and nose in great gushes, fell down, and was dead in twelve minutes from the occurrence of the accident.

Bleeding from the ears has always been looked on as a most valuable sign of fracture of the base of the skull, and so it undoubtedly is, if it is severe and continued. The lining membrane of the ear not being so vascular as that of the mouth or nose, is incapable of itself yielding a violent discharge of blood. Rupture of the tympanum alone may cause a slight hæmorrhage; but when, with brain symptoms, and after such an accident as might cause fracture of the base, there is severe and continued discharge of blood from one or both ears, then fracture in the middle fossa of the base of the skull may be very surely diagnosed. The tympanic membrane must be ruptured to allow of the escape of the blood by the ear; but it may pass into the throat by the Eustachian tube; or, in cases of rupture, it may gain the surface in both ways. A fracture implicating the petrous portion of the temporal bone, and lacerating the tubular prolongation into the ear of the membrane of the brain, and rupturing the membrana tympani, allows also of the escape of cerebro-spinal fluid by the ear after the hæmorrhage has ceased; and when such a discharge occurs profusely, and continues after severe hæmorrhage, we attach much importance to the occurrence in a diagnostic point of view. The cerebro-spinal fluid will, in these cases, be at first bloody, but it afterwards becomes clear and limpid. If the bleeding is slight, or, though profuse, be of short continuance, and the discharge of watery fluid follow it at an uncertain time, and in varying quantities, then we can predicate nothing certainly of its connection with fracture of the base. Such a slight or short hæmorrhage would not necessarily imply fracture; and a profuse discharge of clear fluid may occur by the ear some hours after an accident, and yet not signify a fracture of the base of the skull.

Further, a profuse and persistent discharge of limpid fluid immediately after an accident to the skull, would justify us in declaring that there had been a fracture of the petrous bone, with laceration of the prolongation of the membranes of the brain, and of the membrana tympani.

Cerebro-spinal fluid may, in cases of fracture, escape by the nose; but this is a rare occurrence.

That the fluid escaping in these different ways is cerebro-spinal fluid, is proved by its identity of composition (large proportion of chloride of sodium, small amount of albumen, and its not being coagulable by heat and nitric acid), as well as the abundance of its flow. A serous fluid, easily mistaken for it, has been seen to escape from the ear in very great abundance, when no communication existed or could be found by which cerebro-spinal fluid could have escaped.

Ecchymosis of the tissues over the mastoid or occipital bones, or on the side of the neck, appearing some hours after such a blow as was capable of producing fracture of the base of the skull, would be confirmatory of the other symptoms, always supposing that there was no adequate explanation of the effusion at the part where it appears.

Paralysis of the cerebral nerves is sometimes a very valuable confirmatory sign of fracture of the base and its special seat. Amaurosis, loss of taste, or sensibility in some part of the integuments of the head, may be observed; but the seventh pair of nerves are most frequently implicated, from the line of fracture being commonly such as to injure them, and thus facial paralysis and deafness are not unusual indications of fracture of the base of the skull.

In conclusion, it may be said that if after such an accident as may cause fracture of the base of the skull, we have symptoms of compression (see p. 140) setting in early, and continuing; if there is escape of blood into the eyelids and orbit; or if there is profuse and continuous hæmorrhage by the mouth and nose, or by the ears, followed in the latter case by prolonged discharge of cerebro-spinal fluid; and if there is paralysis of the seventh pair of nerves—the diagnosis of fracture of the base of the skull is certain; whereas the absence of these symptoms does not entitle us to say positively that no such injury to the base of the skull has been sustained.

**SPINA BIFIDA.**—This is a congenital imperfection of the spinal canal at its back part, by which a hernia or protrusion of the membranes (and more rarely of the nerves or cord) takes place. There may be an opening the whole length of the canal, and the protrusion may be elongated, and not circumscribed, as it most usually is. Spina bifida is frequently combined with other congenital deformities, such as hare-lip, cleft palate, imperforate anus; and its combination with hydrocephalus is not unfrequent. There may be several tumours at different parts of the column, and that they are occasionally connected may be proved by alternately pressing the serous contents of the one into the other. So, too, pressure applied to a spinal tumour, having a free communication with the canal, will augment co-existing hydrocephalus. Spina bifida may occur at any part of the spinal canal, but it is in the lumbar region that it is most common. It is very rare in the cervical.

The following are the characters of the tumour:—

(1) It is congenital.

(2) It is in the line of the spinal column.

(3) Its size varies from a marble to a child's head.

(4) In shape it is round, pear-shaped, oval, or more elongated—its long axis being parallel to the spine. It is occasionally bi-lobed.

(5) It usually has a broad base, though more rarely it is pedunculated.

(6) It is tense when the patient is in the erect posture, less so (and then usually fluctuant) when lying on the face, if the communication with the spinal canal is free. Expiration increases the tension of the tumour in like circumstances, and inspiration diminishes it.

(7) The coverings consist usually of unchanged skin, thick, coarse, and horny, or skin reddened, thinned, and apparently about to burst. There may be a small ulcer on its surface by which the fluid escapes. More rarely, there is no covering of integument at all, but the tumour is only protected by the thin translucent membranes of the cord through which the spinal nerves, or their sheaths, may occasionally be seen lying longitudinally, and adherent to the interior of the sac.

(8) Slight pulsation is found in some cases, and there may be movements with the respiration.

(9) Pressure diminishes the bulk of the tumour if the opening into the canal is free; and it will increase at the same time, by the expelled fluid, any other tumour which may exist, and has a free communication with the canal. Such pressure may occasion uneasiness to the child, as will be evidenced by its cries; or it may cause convulsions, or even coma; or it may augment the paralysis of the parts below. In the adult, pressure usually causes flashes of pain up the cord, and into the head or down the limbs.

(10) After the fluid has been expelled by pressure, the bony edge of the opening in the vertebral column can be perceived.

(11) If the coverings are thin the tumour is translucent to transmitted light.

(12) There is weakness or paraplegia of the lower limbs, incontinence of fæces, retention of urine, and afterwards overflow. These symptoms are observed, when the spinal canal is perforated, and the functions of the cord interfered with above the second lumbar vertebræ. Lower down the paralysis may be more slight and more limited.

(13) From defective nutrition the lower limbs remain small and undeveloped.

*Cysts* formed over the vertebræ, and having no connection with the canal, are occasionally met with, and are to be distinguished from spina bifida, by the fact that pressure has no effect upon them; and also by the absence of those indications of interference with the function of the cord mentioned above. Such cysts, too, are very seldom congenital.

A *congenital fatty tumour*, in very rare cases, has been met with over the lower part of the spine, passing through a hole in the bone, and being connected with the membranes of the cord. Its peculiar doughy feeling and pressure (if no traction), having no influence on the functions of the cord, nor in diminishing the tumour, are the only signs by which it can be diagnosed from spina bifida.

When in spina bifida the communication with the canal is very small, or has become altogether closed, there is considerable difficulty in .recognizing the true nature of the tumour, except by its history and the persistence of defective function in the cord. If long-continued pressure succeed in reducing its size, then we can at once recognize its nature, though such pressure should not needlessly be put in force, as there is great fear of irritation and inflammation of the cord being thereby excited.

Further, it is very difficult to discover whether any part of the cord is inclosed in the tumour; but if great pain follows pressure, especially at particular points and lateral movements; if by transmitted light an opaque portion can be discerned (like the testicle in the tunica vaginalis); if after puncturing, a consistent body remain in the sac, which gives rise to much pain on being compressed—then we may conclude that there is inclusion of the cord. Under the opposite conditions we may suppose there is no such inclusion. If the tumour is placed at the union of the lumbar and sacral spine, then the cord itself or its nerves are generally intimately connected with the sac.

## SPINAL CORD.

A. **Concussion.**—May arise with or without fracture of the vertebræ, from blows or falls on the back, falls on the nates, head, knees, or feet, or from a general shock of the whole body, in which the spine participates. The injury may affect the whole spinal cord, or only a portion of it. Sometimes the injury declares itself at once, at other times only after a considerable interval (months it may be), and by slow degrees. The symptoms are those of impaired function in the cord. If severe, there may be indications of general shock, faintness, sickness, and prostration. The reaction afterwards may be excessive, and lead to inflammation. Prickling sensations and formication may be felt in the limbs and back, and more or less paralysis of the parts below the seat of injury, or of all the extremities (if the whole cord has suffered), may be present. There may be also derangement of the function of internal organs and confusion of mind. If recovery takes place these symptoms gradually pass off, but they usually leave some irritation of the bladder, deficient or deranged sensibility, and feebleness in the limbs. There are frequently disagreeable twitchings of the muscles, and diminished sexual desire.

B. **Wounds.**—From stabs, balls, fracture of the vertebræ with depression, dislocation with displacement, &c.

The effects will vary with the part of the cord injured and the extent of the injury.

When partially divided the effects vary much, according to the extent, depth, and particular position of the wound; and while, in some cases, the effects are so distinctive and well marked, as to enable us to distinguish at once the part implicated, yet usually the manifestations are confusing and difficult to unravel.

When the division has been complete, then paralysis of motion and sensation will be established below the point of division. The temperature of the part will be natural or diminished, and the nutrition of the paralyzed parts in the first instance, and ultimately of the whole body (if the cord is divided high up), becomes gravely impaired. The mind remains unaffected till the unpurified blood comes to poison the brain, and then delirium and coma extinguish the intelligence.

As the phrenic nerve comes out from the canal, above the fourth cervical vertebra, any division of the cord *above* that point will cause instant death, by the arrest of the respiration and circulation.

Wounds in the cervical portion of the cord, by which it is divided *below* the phrenic nerve, cause death in from eight to ten days, by slow asphyxia. All parts, except the head and neck, the integument over the clavicles, and the diaphragm, are paralyzed and deprived of sensation. The circulation is slow and the pulse feeble. The respiration is greatly embarrassed, as expiration is alone performed by the elasticity of the thoracic parietes and the weight of the abdominal organs; and these are quite unequal to forced expiratory efforts, as coughing and expectoration, hence the bronchial tubes get clogged and the respiration further embarrassed.

The trapezius and sterno-mastoid, by raising the upper part of the chest, may feebly assist the diaphragm; and if the injury is below the point of exit of the external thoracic nerve, the serratus magnus may supplement both inspiration and expiration. Deglutition is difficult, and the voice reduced to a whisper. The lower limbs are paraplegic; the bladder is no longer able to expel its contents, and comes to overflow when full; and the fæces, at first obstinately retained, are soon discharged without the patient's consent or knowledge. The bladder becomes inflamed, and the urine alkaline, by which the irritation of that viscus is augmented. The abdomen gets tympanitic; the digestion is feeble; Priapism without venereal desire, and without the patient's consciousness, occurs; visceral congestion, bed sores, evidence of imperfect arterialization of the blood, appear, and so death takes place slowly by asphyxia.

If the division is as high up as the third or fourth cervical vertebra, the upper extremities are paralyzed as well as the lower. If any of the filaments of the brachial plexus retain their connection with the upper part of the cord, then the paralysis may be curiously absent in certain portions of the arms.

If the point of division is lower in the cord, some of the above symptoms do not appear. When it is below the cervical, and above the third dorsal vertebra, we find the arms unaffected, and the respiration is slightly relieved by the sterno-mastoid, trapezius, and serratus magnus retaining their activity.

When the injury exists in the lower dorsal, and above the second lumbar vertebra, the respiration is free, as the intercostals and abdominal parietes are no longer paralyzed, and there is not the same want of voluntary power to expel the urine and fæces, as the abdominal walls can then be made to contract.

If the injury (such as fracture with depression) be below the second lumbar vertebra, the cord, properly so called, may escape injury. The nerves of the sacral-plexus alone are implicated, and thus the paralysis may be more limited in the lower limbs, and sensibility may remain in the integument of the genitals, in the anterior and the inner aspect of the thighs, the legs, &c.

As to the method of investigating the degree of sensibility, in cases of injury of the cord, see page 38.

C. **Caries of the Vertebræ.**—Is usually, though not always, a tubercular affection, and occurs most commonly in scrofulous children under fourteen years of age. Its ravages are confined to the anterior segments of the bone and the intra-vertebral substance and ligaments; while the posterior and more dense portions escape. It may arise in any of the regions of the spine; but it is in the upper dorsal that it is most common. It is most to be dreaded in the cervical region. One or many vertebræ may be affected; and the disease may not dip beyond their surface, or it may entirely destroy the whole body of the bone. There may be two centres of the disease at different parts of the vertebral column; but this is rare.

Caries is seen by the surgeon *before* and *after* excurvation has taken place. If he does not see the case till after deformity has occurred, he can have no difficulty in recognizing the disease he has to deal with; but the symptoms which attend the early stage of the malady before the bones have fallen together are occasionally somewhat confusing. Pain is one of the earliest signs. It is more or less severe at a fixed spot in the back, and shoots round the body. It is increased by firm pressure, by tapping firmly on the bone, by contact with a hot sponge or a piece of ice, and by sudden jerks, as in jumping down off a height, or suddenly turning. The patient tries to relieve the pain by assuming a position in which the part is best supported, and the weight relieved. There are evidences, too, of declining health, and it may be feebleness in the gait. The steps are shuffling and uncertain, and the patient soon tires in the erect posture, and can no longer, as formerly, walk, run, or stand with ease and freedom from fatigue. The disease begins and augments with great insidiousness, so that it has frequently obtained a firm hold before it is observed.

The pain referred to above is distinguished from mere neuralgia by its persistence; by its combination with muscular weakness; by its usually occurring in the young; and by an examination of the spine, when, though no excurvation is present, the column will be found to be more rigid than normal; it has not, throughout the affected portion at least, the flexibility and beautiful adaptability to various positions that the spine possesses when in a normal condition. The patient tries to keep it stiff, so as to escape the pain which follows movement. In walking he keeps the part as rigid as possible, and allows the affected portion to participate as little as can be in all bending or turning movements.

The "irritable spine," again, is an affection of hysterical females. The pain is described usually as very severe, and flashing round the body. If the attention is distracted, movements inconsistent with disease are performed, and the general health remains good. No deformity takes place, and no abscesses form, even though the malady has lasted long. There is no abnormal rigidity of the spine, and no real paralysis. The catamenia are usually arrested or deranged.

When, from the subsidence of the excavated bone, posterior projection takes place, the degree of injury to the motor functions of the cord (which suffer before the sensory, for obvious reasons) will mainly depend on the rapidity of the sinking, and the consequent time given to the cord to accommodate itself to the pressure. Paralysis, more or less complete, is frequently present when the disease is extensive and the excurvation great; while occasionally there is no such effect produced in patients in which we would expect to meet with it. The paralysis is not fully established in any case till late in the disease. Spasms in the muscles of the lower limbs, and various abnormal sensations, such as prickling, formication, a feeling as if cold water was poured over the limbs, &c., are occasionally described by patients. The bowels are frequently costive at first, and may latterly act involuntarily, and there may be difficulty in micturition.

Posterior curvature may be more or less acute, the vertebra most excavated forming the apex of the projection ("angular curvature"). The muscles on either side are usually atrophied when the disease is of any standing, and thus the projection is, if possible, rendered more apparent. The skin is often stretched over the projection, and may ulcerate from pressure. Abscesses frequently form; and though there is reason to believe that these purulent collections occasionally become absorbed if the disease is arrested, yet usually they work their way to the surface, and that, it may be, at a long distance from their point of origin.

The projection above spoken of is easily distinguished, from the prolonged prominence which is seen in the back of delicate children. If we lay the little patient flat on its face, then this last gibbosity will at once disappear, while that due to caries remains. Besides, the prominence due to mere weakness involves many vertebræ, and does not present a marked projection at one part of the affected portion of the column.

When caries attacks the highest part of the cervical portion of the column (especially the articulation of the atlas and occiput, or the atlas and axis), the pain and swelling are considerable just under the occiput and down the nape of the neck. The parts become brawny and firm to the touch. The pain passes up the back of the head, over the shoulders, and down the arm, accompanied by weakness of the arms, possibly some feebleness in walking, or even paraplegia if the disease is severe. The head falls forward, and the forehead is projected, and perhaps turned to one side. The spinous process of the axis becomes frequently abnormally prominent. The movements of the head are partially or wholly abolished. The sterno-mastoids are tense and contracted. Any voluntary motion or communicated movement, as in tapping the crown of the head or turning the head, causes exquisite suffering. The head is supported and fixed by the hands, or an attitude is assumed which prevents all motion and takes the weight off the part.

When pus forms and passes down from the affected vertebræ, the symptoms frequently undergo a marked amelioration. This is not always the case; but often, under these circumstances, both the pain and paralysis are relieved. The abscess may form early, even before apparent deformity; but this is uncommon. It is usually late in the disease that abscess appears.

Abscesses forming in connection with disease of the cervical vertebræ most commonly burst into the pharynx ("post-pharyngeal" abscess); or on the side of the neck between the scaleni; or above the clavicle; or into the axilla; or into the anterior mediastinum; or the pleura (rare).

When the abscess comes from the upper dorsal vertebræ, it may fuse along a rib, and point on the parietes of the chest or abdomen; it may burst into the œsophagus or lungs, and may appear in the loins; but more usually it passes downwards internally, and comes to the surface above Poupart's ligament in the groin.

When it proceeds from the lower dorsal and upper lumbar vertebræ, it generally presents as psoas abscess (see p. 282), and may be single or double. It points in the outer third below Poupart's ligament. Further, an abscess may appear in the lumbar region as "lumbar abscess;" or dissect its way downwards to some part of the lower limb, even as far as the ankle. It may appear in the perineum ("perineal abscess"), over the hip, or even pass into that joint, when it has been mistaken for morbus coxæ. It may pass behind the peritoneum and iliac fascia, and appear as "pelvic abscess." Rarely it escapes by the external inguinal ring, in consequence of the pus bursting into the spermatic canal in its passage through the abdominal parietes.

Lastly, it may work its way into the bowel or bladder.

**SPRAIN,** *i.e.* stretching, and it may be partial rupture, of the muscles or ligaments of a part.

The muscles of the back and those of the shoulder are liable to be strained or sprained; but this accident cannot be mistaken for any other. Such sprains, however, are often most obstinate and persistent in their effects; and in persons of a rheumatic temperament, are apt to lead to most injurious results in the wasting and paralysis of the muscles.

Sprain is most liable to affect articulations whose latitude of motion is most limited, and yet whose position renders them very liable to sudden exaggeration of these movements. It is in the wrist and ankle-joints that we most frequently meet with sprain; and in severe cases, not only are the tissues entering into the composition of, and surrounding the joints stretched and torn, but there is often slight and temporary displacement of the articulating surfaces. It is a very rare circumstance for a ball-and-socket joint to be sprained. A sudden twist in walking, grasping, falling; forced extension or flexion or rotation; violent muscular movements; these are the usual causes of sprain.

In healthy persons a sprain is seldom serious; but in the scrofulous and rheumatic it may be attended and followed by grave consequences, from the violence of the inflammation producing stiffness and feebleness, and even organic disease.

Pain, often violent and sickening, occurs at the moment of the accident, and is augmented by movements however slight; yet the patient often walks some way with a limping gait after sustaining it. If the ligaments are torn, we may distinguish shortly after the occurrence. when the patient is under chloroform, even a greater freedom of passive motion in the articulation than normal; but when swelling sets in this can no longer be found.

The swelling and tension are considerable, and soon appear.

In a few days ecchymosis marbles the joint, and as it disappears the colour passes through many shades. A joint so sprained is long weak, and liable to subacute or chronic inflammation.

Sprains are to be distinguished from *dislocation*. It may be observed in this connection that those joints which are most open to dislocation are just those least liable to sprain.

The points that we attend to, in order to distinguish these two accidents, *when we see the accident early*, are:—

(1) In sprain, the limb is frequently used in a crippled way after the accident, while in dislocation the function is altogether in abeyance.

(2) In sprain, passive motions are possible under chloroform; in dislocation, movement is lost.

(3) In sprain, there is no change in the length of the limb; in dislocation, there is.

(4) In sprain, the articulating processes retain their relationship to one another; in dislocation, they do not.

(5) In sprain, there is swelling, causing deformity; but it is diffused and entirely due to effusion, hence it is even and soft. In dislocation, the swelling is due to displaced bones as well as effusion, and is consequently irregular and hard.

(6) In sprain, the shape of the joint is not so changed as it is in dislocation.

(7) The discoloration is sometimes in sprain differently situated as regards the joint from what we find it in dislocation, where it is usually confined to one aspect of the articulation.

*When seen late*, and the swelling, tension, and pain are great, we can form no safe opinion, and must wait.

Sprain of the ankle is very apt to be confounded with *fracture of the fibula* low down; but in the latter case, careful manipulation will discover the irregularity of the bone, and pressure at the fractured spot gives great pain. Further, if the leg is firmly fixed, the astragalus may be moved laterally, in the case of fracture, with abnormal freedom, while crepitation may be observed. If the leg is fixed, and the sole of the foot is rotated well inwards; or if the toes are freely moved outwards and inwards alternately, then unnatural mobility and crepitation will be usually found in the case of fracture, but not of course in mere sprain.

**SYPHILIS**, CONSTITUTIONAL. *See* CHANCRE.

Secondary symptoms appear on an average within six weeks after contagion; and though they may be so slight as to be overlooked, yet they are never delayed beyond six months. Temperament, hygienic conditions, sex, and age perhaps, constitution certainly, and climate (heat hastening and cold delaying), influence to a certain degree the period of evolution of the constitutional disease, and in some measure also the form in which it appears, and the seat that it occupies.

A roseolar eruption on the skin, and sore throat, are the most common early symptoms of constitutional infection; and the appearance of these, or other constitutional symptoms, may or may not be preceded by signs of failure in the general health, as, for example, "syphilitic fever" at night, gastric derangement, loss of appetite, head-ache, pains in the limbs and joints, head and shoulders. The skin frequently changes in colour and loses its pliancy. It becomes dry and rough, brown, dirty, sallow, and various eruptions appear upon it.

The "syphilides" or syphilitic skin eruptions are symptoms of secondary affection, which appear either in the individual himself, or in his offspring. Some of them occur in the secondary, some in the intermediary, and some in the tertiary stage of the malady. The precise character of the eruption is frequently very difficult to diagnose, from the fact that several different primitive forms often concur, and are mingled together, and so the character of each is modified and confused; yet, in most cases, it is of less consequence for us to be able to give a correct designation to the form of the eruption, as clearly to connect it with its syphilitic origin.

There are certain well-known marks of the syphilitic source of an eruption, which will be first enumerated, it being premised that probably none of the undernoted distinctions (unless it be one or two of them when they are very clear and unequivocal) can by themselves be considered as characteristic. When several concur, they are, however, distinctive.

(1) *Colour.* Coppery. The smoked bacon colour of Fal-

lopius. This is not always present in true syphilitic eruptions, and may be observed, or, at least, a very similar shade may occur, when there is no syphilis; hence, if it is absent, there is no sure proof of the eruption not being syphilitic; but if present it is valuable as a confirmatory sign. It may be present at one stage of the eruption, and absent at others, and the tint is usually brighter at an earlier period than the characteristic shade; but as the eruption declines the true copper colour appears, and may remain long after the eruption has gone.

(2) *Shape of patch.* Circular, or the segment of a circle. It is sometimes oval, and sometimes of the figure of 8. It is in the ulcers which attend or follow several of the syphilides that this circular disposition is best seen. The circular form is not by any means a constant one in syphilis, and in some few non-syphilitic eruptions it may be present; but if it is marked, and combined with the colour before mentioned, it is very characteristic.

(3) *Scab or crust* is harder, thicker, drier than that which accompanies the simple non-syphilitic eruptions. It is often laminated, dark in colour (black even), rough, like the shell of an oyster; or prominent, like that of a limpet. Sometimes it is green and gummy, and is surrounded by a white line or border, which Biett considered pathognomonic.

(4) The ulcers which are present below the scabs in many of the eruptions are round punched-out sores, having abrupt borders, gray adherent sloughs, and coppery-coloured halo around.

(5) *Cicatrix.*—Round shape, usually deep, and ultimately becomes irregular and depressed. In colour the cicatrix is at first violet, and then coppery, and may at last be white. The copper colour is occasionally more evident in the cicatrix than in the previous eruption.

(6) *Ganglionic enlargements* are found in different parts of the body. The post-occipital, and those at the side of the neck, are the most usual glands to undergo enlargement. These glands are hard, indolent, and rolling. (See p. 167.) The wide contamination of the lymphatic glands throughout the body soon begins to tell on the nutrition of the tissues, and so cachexia and anæmia follow.

(7) *Site.*—The syphilides may appear upon any part of the body, but certain eruptions affect certain portions by choice. Lichen occurs on the back and chest; psoriasis on the palms of the hand and soles of the feet, &c. Syphilitic eruptions appear first, as a rule, on the parts which are exposed to the air, as the face, chest, shoulders, arms, &c. According to Divergie, the syphilides appear on different parts in the following order of frequency:—Round the alæ of the nose and angles of the mouth; the roots of the hair at the forehead and back of the neck; the inner angle of the eyes; the centre of the breast; the inner side of the limbs, the neighbourhood of the axilla and the groins.

(8) *Constitutional disturbance* is generally very slight, considerably less than that which accompanies the simple eruptions.

(9) The syphilides are frequently developed *symmetrically*. This, though a frequent, is by no means a universal disposition, nor can it be said to be peculiar to these eruptions.

(10) *Pruritus*, heat, and pain are rare in the syphilides. It is when there is a combination of a pruriginous eruption with a syphilide, that we meet with these symptoms.

(11) The syphilides are, with the exception of the early rashes, *chronic* in their progress.

(12) Contemporaneously we have frequently many elementary types of eruption present ("*polymorphism*"), papule, vesicle, pustule, &c., appearing at the same time, and in the progress of the affection the species of eruption is apt to change from one to another.

(13) If other evidence of constitutional disease is present (nocturnal pains, loss of hair, nodes, ulcers, &c.), then there is great light thrown on the symptoms.

(14) The syphilides are curable by mercury, hydriodate of potash, or a combination of these drugs. "Naturam morborum ostendit curatio."

(15) It may be added that the syphilides tend to fade for a time, and again to reappear, if not prevented by treatment; and that if there is a relapse, we never have the same form of eruption recurring, but another of a more advanced character follows—one showing a greater constitutional intoxication.

If several of the above distinctions are combined, the diagnosis will be satisfactory. In obscure cases it is requisite to pay great attention, in order to recognize these characters. The syphilides occasionally develop themselves rapidly, in consequence of some excitation of the circulation, as after a hot bath (especially the Turkish bath), violent exercise, the use of stimulants, or even in consequence of vivid mental emotion.

As to special eruptions we may have—

(1) Maculæ.
(2) Exanthemata. Rashes.
    (*a*) Roseola; (*b*) Erythema.
(3) Papulæ.
    (*a*) Lichen; (*b*) Mucous papule.
(4) Squamæ.
    (*a*) Lepra; (*b*) Psoriasis; (*c*) Horny eruptions of the palms and soles.
(5) Vesiculæ.
    (*a*) Herpes; (*b*) Eczema; (*c*) Varicella.
(6) Pustulæ.
    (*a*) Acne; (*b*) Ecthyma; (*c*) Impetigo; (*d*) Rupia.
(7) Bullæ.
    (*a*) Pemphigus.
(8) Tuberculæ.

Of these the following are early in their appearance—roseola, erythema, lichen, vesiculæ, lepra, psoriasis, mucous papule.

The following are late of being evolved—maculæ, pustulæ, horny and scaly eruptions, tuberculæ.

Bullæ are usually hereditary, and appear generally soon after birth.

The early eruptions commonly end in resolution; the late in ulceration. Some of the late are superficial (as bullæ and pustulæ), others dip deeper (as the tuberculæ), while others again pass still more deeply into the integuments, as the tertiary gummy tumour.

Let us look at the distinctive characters of the several eruptions individually.

(1) **Maculæ.**—These are spots of various sizes, and of round or irregular shape. They are brownish or gray-coloured, not prominent or attended by heat or itching. They are isolated or run together. They occur on the front of the chest, and on the side of the neck, and are chiefly observed in females. The patches of sound skin which are inclosed by the discoloration, are so white and marked by contrast, that they are apt to be taken for the diseased portions. This affection is usually a late one of appearing, but it may be intermediary, that is, it may occur between the outbreak of the secondary and the tertiary symptoms.

(2) **Exanthemata.**—Roseola occurs as small, round, isolated, or confluent spots, of a rosy or coppery colour, not prominent from the surface, and disappearing on pressure at first, but not after they have existed for some time. These spots usually last only a few days, and end in a mere mottling, and finally in desquamation. This eruption may be rapidly or slowly developed. It is the earliest of the syphilides, seldom appearing before the third week, or being delayed after the third month from primary infection. It is the least severe of the syphilides, and appears on the lower part of the chest, the belly, loins, and inner surface of the limbs. It is very seldom observed on the face or neck. From its slight and evanescent character this eruption is frequently overlooked by both the patient and surgeon.

It is distinguished from measles, by the absence of all catarrhal symptoms, and there being traces of the primary sore, or of glandular enlargement in the groin.

(3) **Papulæ.**—(*a*) *Lichen.* This is a common and an early syphilide. It is chronic in its course, and presents numerous small, hard, slightly prominent pimples, sometimes in groups, and having one papilla more prominent than the rest in the centre of the group. It does not tend to ulcerate, but at one period of its progress is covered with fine scales, which are shed, and reappear in crops. It leaves a rosy discoloration, which becomes coppery, and finally disappears. There is occasionally a white line round the papules. Lichen appears generally on the back of the neck, the face, loins, and the extremities.

(*b*) *Mucous papule* (or tubercle). This is a fleshy, round, oval, or irregular mass, of a size varying from a pea to the palm of the hand, discrete or confluent, occurring at the orifice of the mucous canals on the skin or mucous membrane, or both. It occurs by choice, where there is moisture and heat, and especially where two surfaces come into contact. Mucous papule may be moist or dry. It is usually moist, being more or less bathed in a very fœtid discharge, which, with proper precautions (especially long contact), will inoculate itself and produce sores, followed by constitutional disease. It is mostly seen in the female, and constitutes an early secondary symptom. Occasionally, in place of being red and covered by a creamy discharge, the mucous papule is white and "opaline;" sometimes again it occurs as a fissure or cleft, with elevated fleshy borders; sometimes it is fungous and elevated; sometimes it is flat and spreads a long way over the surface; occasionally it is distinctly copper-coloured, or has a border of that colour; sometimes it is painful and itching, while more generally it is indolent. Occasionally it presents a small ulcer on its surface, and rarely it takes the form of an elevated ulcer, the edges of which remain high. In some cases the chancre becomes converted "in situ" into a mucous papule, as the primary gives place to the secondary or constitutional symptoms.

(4) **Squamæ.**—(*a*) *Lepra.* Occurs in circles or segments of circles. A brown patch with fine scales, the centre depressed, and the edges raised. The scales appear in crops. It occurs chiefly on the limbs, chin, and lips.

(*b*) *Psoriasis.*—Appears on the palms and soles, knees and elbows, and on the trunk. Fissures are frequently present on the palms accompanying the eruption. It may be either diffuse, or in separate small patches over the part, and presents irregular spots on reddish-brown discoloured patches, having, according to Biett, a characteristic white border round the patches. The scales of syphilitic psoriasis are smaller, thinner, and finer, and the patches usually smaller, than in simple psoriasis, and the skin between the patches is sound.

(*c*) *Horny Eruptions* of the palms and soles. Round, hard, horny patches set in the tissues, and little prominent, and having a brown coppery border.

(5) **Vesiculæ.**—This is early in its appearance, but is not a common syphilide. It is chronic in its course. The vesicles are longer of rupturing than in the simple non-syphilitic vesicular eruptions.

(*a*) *Herpes.*—In round or irregular groups, having a coppery border, ending in small scales and brown stains, which soon disappear.

(*b*) *Eczema.*—This occurs in irregular groups of small vesicles disseminated or confluent, with a coppery margin. It appears on different parts in succession, and ends in desquamation; and leaves brown stains.

(*c*) *Varicella.*—Large, flat or acuminated, or globular discrete vesicles, occurring in crops, with coppery margin, leaving a greenish crust when they burst and dry, and afterwards a brown stain, which slowly disappears.

(6) **Pustulæ.**—Appears in those whose general health has been lowered from any cause.

(*a*) *Acne.*—Has no special seat, like the simple affection (which appears on the face, chest, and back), but may occur on any part of the body. It is usually disseminated, but sometimes appears in groups. It is rarely confluent. The eruption consists of pustules on a red base, and having a coppery margin, drying on their summit into yellow or brown scabs. It is sub-acute or chronic in its course. After the crust falls, there is left a marked coppery stain, and a little projection, or hollow, or small ulcer, at their former seat.

(*b*) *Ecthyma.*—Large, broad, flat pustules, sometimes having a depressed centre; discrete and confluent, on a round, hard base, and with a brown circle. They are frequently solitary. The scab which forms is thick, soft, tenacious, blackish or yellow, or green and rough. It is long of separating, and there is an ulcer below, which is of round shape, with abrupt edges, and a gray tenacious slough. This sore is slow to heal. A persistent, or it may be indelible cicatrix, like that of a burn, remains behind. With proper precautions, this sore is inoculable.

(c) *Impetigo.*—Small pustules in groups, confluent or discrete, on a red surface, and having a thick, soft, yellow, green, gray, or black scab ("pustulo-crustaceous"), very chronic, and leaving an indelible stain, or at least one which is long of disappearing. It may occur in any region, but is most frequently seen on the face. It may appear simultaneously upon various parts.

(d) *Rupia* (also classed as bullar and pustular).—Large, close-set pustules, ending in thick, hard, rocky (like oyster-shell) scabs, which are sometimes flat, but more frequently prominent and nipple-shaped like limpet-shells. In colour they are green, or black, or brown. The scab is frequently laminated by the successive secretions poured out. The ulcer below is round and deep, with punched borders and a grayish slough, and the cicatrices are indelible; being of a copper colour at first, and afterwards of a dull white. It is a late or delayed syphilide, and very chronic. Occasionally it is seen in crops, and not unfrequently associated with the tubercular syphilide.

(7) **Bullæ.**—Pemphigus occurs usually in new-born children at birth or shortly afterwards. It occupies the palms and soles. It is very rare indeed in adults. The fluid which the blebs contain is clean or purulent. The surface below the bulla is sound or ulcerated.

(8) **Tuberculæ.**—This is an intermediary or tertiary eruption, and is the worst of all the syphilides. It is a rare eruption, and is usually very late of appearing. The size of these masses varies from a pea to a pigeon's egg. They occur on the face, back, shoulders, and dorsal surface of the limbs. They are hard, round, painless, copper-coloured tumours, which sometimes ulcerate and cause much destruction, either superficially or deeply. The ulcers get covered by a green, thick scab, and the syphilitic cachexia is often well marked. They may wander over the surface, leaving a deep seam-like and indelible cicatrix behind ("serpiginous"). They may be few and isolated, or many and in groups. This eruption is very chronic.

*Alopecia*, or loss of hair, is sometimes classed as a secondary, sometimes as a tertiary syphilitic affection; while warts, inflammation of the pharynx and larynx, iris (iritis is most generally intermediary: it is distinguished by the reddish coppery hue of the pupillary margin), ear, nose, and nails (as onychia, or a scaling with irregular thickening and crumbling down, splitting and pitting of the nail), are further manifestations of the disease.

**Tertiary Syphilis** does not manifest itself within any definite time, but may be many years after the primary infection before it breaks out. The tertiary symptoms appear in the deep cellular tissue and locomotive apparatus, bones, fibrous, and muscular tissues, the glands, internal organs, &c., the whole accompanied by constitutional cachexia, evidencing deep and serious injury to the health. Gummy tumours occur on the surface of the skin, or in the cellular tissue, or beneath mucous membranes, or between the muscles (especially the flexors of the arm), or in internal organs. They are at first hard and indolent, and ultimately soften, becoming obscurely elastic, and bursting, and giving rise to a rebellious ulcer and deep coppery cicatrix, which forms one of the most prominent and characteristic symptoms of tertiary syphilis.

The destructive ulceration just referred to is not unusual on the face, when the nose, lips, and cheeks may be destroyed. Acute and chronic (especially the latter) periostitis, nocturnal pains in the bones and joints simulating rheumatism (affecting the superficial bones), nodes, exostosis, caries, and necrosis, unhealthy and obstinate ulcerations in the mucous canals (mouth and tongue especially), disease of the nails, and many internal organs, spleen, liver, kidney, intestine (especially the colon and the neighbourhood of the ilio-colic valve, causing obstinate dysentery), heart, and brain, substance of the nerves, eye, testicle, &c., are observed in the tertiary stage of syphilis. The testicle may undergo enlargement, and so remain, or ultimately atrophy. The absorbent glands throughout the body are also enlarged; and, according to Dr. Brodrick, there is always a tender spot discovered on pressure at the union of the lower and middle third of the sternum.

**Hereditary Syphilis.**—A child with inherited syphilis may at birth be apparently in robust health, and show no indications of syphilitic disease till a few weeks after its birth. The evolution of the disease in them is, however, rarely delayed later than three months, and never later than a year after birth. On the other hand, an infant may be born withered and old—a perfect "miniature picture of decrepitude." This occurs when the mother has been very unhealthy during her pregnancy. Then the skin is dark, smoky, and leathery ("café-au-lait"), especially on the more prominent parts of the face; the infant is more or less emaciated; there are blotches on the surface of the body; occasionally pemphigus appears on the palms and soles; and inflammation of the mucous orifices is present, running at the ears, nose ("snifters"), anus, or vulva; ophthalmia, dysentery, and abscesses in various parts. The voice is hoarse and querulous, and there are often various maladies of internal organs.

The eruptions which appear in those children who, though born apparently healthy, afterwards exhibit evidence of constitutional disease, are most usually mucous papule, erythema, pemphigus, and scaly eruptions. More rarely the pustular and the tubercular eruptions appear. The growth of these children is stunted. They are weak, and suffer from derangements of the bowels. Dentition is difficult, and they are usually prostrated easily by any illness. They become the victims of the worst form of scrofula and rickets. They suffer from convulsions and chronic skin eruptions, and puberty is slow of being established.

Adults, the subjects of inherited syphilis, have an earthy, muddy colour of the skin, which may be seared, or thick, heavy, and dry. The nose is often flattened or sunk, and there are cicatrices at the angles of the mouth, and they have that heavy look usually connected with the dark form of struma. The hair and eyebrows are scanty and arid, and skin eruptions are common. The traces of iritis are often detectable, and "interstitial keratitis" frequent.

Mr. Hutchinson looks upon a short, stunted, pointed condition (symmetrical) of tho centre incisors of the permanent teeth in the upper jaw, as being characteristic of hereditary syphilis, when that shape is accompanied by a vertical notch and a dark unhealthy colour of the tooth; and he is particular in drawing a distinction between this syphilitic condition and the honeycombed, or pitted, or craggy, or transversely fissured, or merely broken teeth which are so common, and which have no such significance as that referred to.

## TESTICLE.

**A. Undescended Testicle.**—The gland may lie in the abdomen, or deep in the iliac fossa, or in the inguinal canal, or just outside of the ring; or it may be placed in the crural canal, or in the perineum in front of the anus. When within the abdomen, the testicle cannot be found, though its absence from the scrotum can of course be recognized. When in the inguinal canal, and no inflammation is present, it is recognized by observing—

(1) Its absence from the scrotum.

(2) The presence of a body, whose long axis corresponds to that of the canal. It is oval in shape, slightly flattened, firm, and resistant to the touch.

(3) The peculiar sickening sensation caused by pressure.

(4) The upper end of this body is continuous with the cord, and its lower extremity is slightly enlarged.

(5) It is frequently reducible partially or wholly by pressure, but easily returns again to its former position, on the pressure being removed.

(6) It has no impulse communicated to it by coughing.

Undescended testicle is not unfrequently complicated with rupture, and occasionally also with hydrocele.

It may be confounded with hernia, enlarged lymphatic glands, and abscess.

From *bubonocele* it is distinguished by the absence of the testicle from the scrotum; by its shape and consistence; by the peculiar pain on pressure; by its probably being imperfectly reducible, and if it is completely returned, there being no gurgle accompanying its reduction; by the absence of impulse on coughing, and its reappearance "en masse" without the peculiar feeling caused by the re-descent of a hernia.

If combined with a congenital hernia, more care is required to discriminate it, especially if there is fluid in the tunica vaginalis at the same time. Then the absence of the gland from the scrotum; the varying consistence of different parts of the tumour; the fluctuation of fluid in one part, and the consistence of the testicle and herniary mass in the other; the effects of pressure in causing the peculiar pain above referred to, and the effects of pressure in reducing the mass more or less; and lastly, the influence on the tumour of coughing—all these points will require to be carefully examined and weighed.

*An enlarged lymphatic gland* is differentiated by its size, position, and the absence of those signs above-mentioned, indicative of the presence of the testicle.

*Abscess.*—Here the previous presence of inflammation with its usual signs, and the absence of those symptoms indicative of the presence of the testis, and it may be the use of the exploring needle, will supply the terms of the diagnosis.

If a testicle so retained becomes inflamed, then the most violent symptoms, local and general, may arise. Great swelling and pain in the groin, with possibly effusion into the scrotum, general pyrexia, sickness and vomiting, so that the absence of the testicle cannot be recognized, and the affection may be mistaken for strangulated hernia. The history of the case will here be of the utmost service—the previous absence of the testicle from that side of the scrotum—the existence beforehand of a tumour in the groin—the fact that a blow was received on the groin—the freedom of the intestinal canal, and the swelling and pain in the groin having become greater in the time which has intervened since the symptoms set in, than we observe in strangulated hernia, and lastly, the swelling being probably harder and more tense than that in hernia.

An inflamed testicle may, in some circumstances, be mistaken for a *bubo;* but the absence of the gland from the scrotum, and the more rapid progress of the symptoms, will guide us.

In any of the other abnormal positions (besides the groin), in which an undescended testicle may be found, its absence from the scrotum, its shape, consistence, and the peculiar pain when pressed, will distinguish it.

**Acute Orchitis** is sufficiently distinctive in its character to prevent any possible confusion.

**Chronic Orchitis.**—May remain after an acute attack, or result from repeated and prolonged irritation (as in stricture of the urethra, or any other irritation of the urinary organs), or injury. It is a rare affection, and is occasionally combined with fluid in the tunica vaginalis ("hydro-sarcocele"). The gland becomes slowly enlarged, with little or no pain, it retains its shape, gets heavy, is smooth on the surface, incompressible, elastic, remains long unchanged, unless it becomes the seat of acute inflammation or atrophy, and ultimately causes dragging pain by its weight. It ultimately loses most of its sensibility when pressed. Both glands are seldom affected, but if such should occur, they are more commonly affected in succession than simultaneously. The veins of the cord are enlarged. Beyond this there is no disease of neighbouring organs.

This malady may be confounded with tubercular disease, cancer, and syphilitic disease, and the distinction will be pointed out under each of these heads.

Occasionally the spermatic fluid in these cases is said to assume a rosy tint.

**Neuralgia of the Testis** occurs, as does "irritable testis," in weakly, nervous young men, when the general health has been depressed by overwork in a close atmosphere. Persons of that class whose digestive functions are impaired, and especially those who have masturbated in youth, and who have suffered mental as well as bodily depression therefrom, are peculiarly liable to this malady. Occasionally it is apparently due to irritation of the kidney and to varicocele, and disappears when these complaints are cured.

The pain is usually very violent while it lasts. It comes and goes suddenly, without any obvious cause. It is confined to one side, and frequently flashes up to the loins and down the thighs. The gland is unchanged in structure, and can be usually handled between the paroxysms without arousing the pain, unless there be irritability of the testicle as well. During the paroxysm the testicle is frequently retracted against the ring, and the scrotum pursed up. Occasionally it causes nausea and retching, and the attack may be followed by considerable prostration, and may recur at uncertain intervals; occasionally the attacks are periodic, but the time of their continuance varies much.

**Irritability.**—Here there is abiding, and not mere transient pain in the gland. It is much less severe than neuralgia. Such pain is usually augmented by all contact or even movement; but it never wholly disappears. A slight degree of it is occasionally seen at puberty. It may influence both glands, or one only, and that most frequently the left. The pain is of an aching character, and is increased when the gland is allowed to hang down unsupported, or when it is touched. Frequently even contact with the clothes and the act of defecation arouses it. There is no disease discoverable in the gland; but the spermatic veins may be enlarged; and the general health, though seldom robust, is not notably affected by the disease. The affection occasionally implicates neighbouring parts, as the anus, rectum, and bladder, and may cause the most intense despondency and melancholia. Although the whole gland is more or less implicated, yet a particular spot is often more markedly painful than the rest. In these cases the condition of the kidneys and urethra should be examined for the source of the irritation.

The only complaint this malady can be confounded with is gravel; and an examination of the urine, together with a minute regard to the history of the case, will differentiate them.

**Tubercle of the Testis** generally begins in the "globus major" of the epididymis, and comes secondarily to affect the testicle. It is very slow and insidious in its progress, causing for a considerable time little or no uneasiness, and giving rise to little pain even when pressed. It is in early manhood that it is most frequently seen; and commonly affects simultaneously or successively both testicles, extending ultimately to the vas deferens, vesiculæ seminales, and prostate gland. The testicle becomes enlarged, but retains its shape, having irregular, knotty, hard nodules on its surface, and being elastic between such knobs. There is sometimes (though not invariably) effusion to some extent into the tunica vaginalis; and this effusion may be either in one mass or in several small separate ones walled in by adhesions. There may be evidence of tubercular disease in the cervical glands, or in the lungs, or in the abdomen, or in the bones or joints at the same time.

After an uncertain interval, sometimes not for years, however, the tubercular matter undergoes softening. Adhesion takes place between the scrotum and one or more of the prominent deposits on the surface of the gland. Ulceration follows, and on the abscess bursting, the yellow, cheesy, tubercular matter is expelled with the pus, and occasionally seminal fluid, too, is thus discharged.

This ulcerative process is sometimes very painful; at other times it causes little disturbance. The opening established becomes fistulous; and the gland may be entirely evacuated by the orifice in the form of discharge, and a hard cord is felt connecting it with the gland. Sometimes the opening heals with a depressed cicatrix; sometimes again benign fungus becomes established.

The recognition of this affection then hangs on the following points—

(1) The age and constitution of the patient.

(2) Its indolent, chronic progress.

(3) The primary implication of the epididymis, and the irregular, nodular surface, and absence of pain, till suppuration is established.

(4) The suppuration, ulceration, and discharge, with the peculiar nature of the secretion.

(5) There being frequently a similar disease of the vesiculæ seminales and prostate, as recognized by examination per anum.

(6) There being probably tubercular disease of the lymphatic glands or lungs.

Tubercle of the testis may be confounded with chronic orchitis, and syphilitic or cancerous disease. From *chronic orchitis* it is distinguished by the specific characters above noted, by its slower and more insidious progress, and causeless rise—by the less degree of pain experienced, and by the class of persons in whom it occurs. Further, it is distinguished by its beginning in the epididymis, and its not attaining so great a size—by its suppurating and bursting, and discharging scrofulous matter, or giving rise to benign fungus, which chronic orchitis more seldom does. If the vesiculæ seminales and prostate, or the lungs, are affected, then there can be little doubt as to the character of the disease. If there is fluid in the tunica vaginalis the distinction is more difficult.

As to the diagnosis of tubercular testicle from *syphilitic disease*, see p. 444.

From *cancer* it is often very difficult, indeed, to differentiate tubercular disease, until it bursts. Cancer, however, is usually much more rapid; and the iliac glands being affected, and the peculiar cachexia of cancer appearing, as well as the greater size of the tumour, will commonly prevent confusion.

**Cancer.**—May be of the hard, soft, or melanotic varieties, as a primary disease, and epithelial cancer may appear as a secondary affection. All these forms of cancer are extremely rare, except soft encephaloid cancer, which is not by any means uncommon, and is often taken as the type of that disease, just as hard cancer in the breast is of scirrhus.

Soft cancer is occasionally seen in very young children, but it is in middle life that it is most usually met with. It is nearly always unilateral, and begins in the gland, extending afterwards to the epididymis and cord. Effusion into the tunica vaginalis is a common accompaniment of the disease. The enlargement of the gland is at first slow, and though most generally attended with lancinating pains, it is not unfrequently painless. If there is pain, it is intermittent and severe like stabs of a hot needle, and it flashes up to the back. The shape of the gland is retained till it bursts the tunica albuginea, when the progress of the growth is much accelerated. To the touch the tumour feels bossy and irregular, being soft and elastic (sometimes almost fluctuant) at some parts, and hard and nodular at others. It is heavy and tense. The arteries and veins of the cord are enlarged when the tumour has attained any size, causing the cord to feel thicker than usual, and the veins of the scrotum are prominent and tortuous. The skin becomes adherent, discoloured, and stretched. The cord gets knotty and hard, and the disease extends to the scrotum. The glands in the iliac fossa become early affected, and if the patient is emaciated an enlarged mass may be felt lying along the spine. The glands in the inguinal region participate in the disease at a later date; and finally, the general health gives way as the cancer comes to pervade the constitution. The disease makes constant progress. If the patient does not die of internal disease, before the period comes round when the accident may happen, the bag distended by the growth (and it allows of a very great degree of stretching) gives way, and a malignant fungous growth appears. This is accompanied by a fœtid bloody sanious discharge. The nature of the affection can then no longer be doubtful. There is occasionally œdema of one or both limbs, from the interference by cancerous deposits with the circulation in the groin or in the abdomen, and serous effusion into the abdomen or chest may also occur.

Cancer of the testis may be confounded with tubercular disease, chronic orchitis, hydrocele, hematocele, cysts, and syphilitic disease of the gland; but its progress, shape, consistence—the implication of the cord and of the constitution—the affection of the glands—the nature of the discharge and protrusion after ulceration—will distinguish it. In some cases the use of the exploring needle might be justifiable, when other means of recognition failed to elucidate the true nature of the disease.

It may be distinguished from *chronic orchitis* by its more rapid progress; its softer consistency; the pain; the implication of the glands in the axilla; its greater size and less weight as compared with its bulk; and by the effects of treatment.

From *hydrocele* it is recognized by not being fluctuant (though, at some spots presenting a very similar feeling), nor transparent; by the testicle not being found (or seen) at the back of the tumour, as in hydrocele; by the fact that the cord enters the growth, and is thickened, and its vessels enlarged, further by its shape and consistence (not having the perfectly smooth, uniform surface of hydrocele); its not growing up from the bottom of the scrotum; and its greater weight. Finally, we have the affection of the iliac glands, and probably the constitutional cachexia in cancer.

*Hematocele* is diagnosed from cancer by its special characters. It is not transparent, and being of some weight and consistency, it is easily confounded; but it follows generally on injury; it is of shorter continuance; attains its size at once, and then remains unaltered, and is not attended with the lancinating pains so common in cancer, nor the glandular or constitutional complication of cancer. The testicle can only be detected by pressure.

A puncture will, either in the case of hydrocele or hematocele, at once clear up any doubt—the surgeon being prepared to remove the gland if it is malignant disease.

*Cystic disease*, again, is slower in its growth, and is more uniform on the surface and in consistency; yet frequently no certain distinction can be made at an early period, unless a grooved needle is employed; afterwards the enlarged veins, the diseased glands, and the implication of the constitution when the disease is medullary, will distinguish them.

From *syphilitic disease* cancer is differentiated by the history; by the past or accompanying symptoms of syphilis; by the absence of the pain that exists in cancer; by the chronic, slow, indolent character of the syphilitic affection, as compared with the cancerous, and by the skin over a syphilitic testicle being sound and not adherent. *Both* testicles are usually implicated in syphilis, and one only in cancer. Syphilis is curable by hydriodate of potash, or a combination of mercury and that salt; cancer is not. Medullary disease is at first hard, and then softens at points, and always gets (and quickly) worse, and attains a much greater size than the syphilitic testis. The skin becomes adherent and ulcerates, and the glands and cord are diseased.

In conclusion, I may add the practical remark of Mr. Paget, having reference to the difficulties of diagnosing some cases, that no testicle should be condemned as cancerous till the effects of mercury, iodine, and colchicum have been tried.

**Syphilitic Disease of the Testes.**—This is an intermediary or tertiary symptom of the disease. The gland enlarges without any known cause (usually), and increases slowly and with little pain. Sometimes, though more rarely, the disease begins with pain in the cord, shooting up to the loins, and this is observed before the testicle begins to enlarge. The gland may remain enlarged, or afterwards atrophy. The function of the testicle goes on for a time; but by degrees sexual desire ceases as the gland becomes destroyed. When the testicle is augmented in size, its weight causes inconvenience, and there may be considerable uneasiness in the affected testicle, especially at night. There is commonly fluid collected in the tunica vaginalis, and the testicle itself is hard, resistant, and heavy. The gland retains its shape; and though irregular at first in its outline, becomes at last smooth on its surface. Both glands or only one may be affected. The epididymis may or may not participate in the disease—generally it escapes. There is very rarely suppuration established.

From *chronic orchitis* this affection is distinguished by the absence of injury or local irritation; by the history of the case and its accompaniments.

From *tubercle* of the testis, by its history and accompanying symptoms. There is in tubercular disease an adhesion of the skin and suppuration, which are not observed, except rarely, in syphilitic disease. Besides, there is usually a similar disease of the vesicula seminalis, and prostate gland, in tubercular disease. One gland is affected in the first instance in scrofulous disease; both usually in syphilis. Syphilis is curable by appropriate remedies, while a tubercular affection is not. There is fluid usually in the tunica vaginalis in syphilitic affections of the testicle, and seldom in tubercular.

From *cancer*, see p. 443.

The three affections of the testicle which are most apt to be confounded are—(1) the syphilitic; (2) tubercular; and (3) cancerous.

They are distinguished by attention to the following points:—

(*a*) *Age.*—(1) Very rare before puberty.
 (2) Occurs in early manhood.
 (3) Observed at all ages.

(*b*) *History.*—(1) Antecedent history of syphilis, and usually the accompanying indications of that disease. The disease begins in the gland, and rarely invades the cord.
  (2) Scrofulous habit and probable evidence of tubercular disease in neighbouring or internal organs. The affection begins in the epididymis.
  (3) Begins without cause and in the gland, but soon invades the cord.

(*c*) *State of the general health.*—(1) Patient robust or affected with syphilitic cachexia.
  (2) Scrofulous.
  (3) Little affected at first; but cancerous cachexia ultimately established when the disease is advanced.

(*d*) *Progress.*—(1) Slow and indolent; rarely eventuates in adhesion of the skin or suppuration. Usually accompanied by effusion into the tunica vaginalis. Remains stationary after attaining a certain size, or the testicle atrophies.
  (2) Slow and painless; suppurates and bursts, ending in fistulous or benign fungus. It is the exception for the disease to be accompanied by effusion into the tunica vaginalis.
  (3) Rapid progress. Always getting worse. Attains a great size. Invades the cord. Causes disease of the abdominal glands and constitutional cachexia Gives rise to adhesion of the scrotum, perforation, and malignant fungus.

(*e*) *Pain.*—(1) Seldom great, except from weight. Occasional pain in the gland, increased at night.
  (2) Absent till suppuration occurs.
  (3) Although little pain at first observed, ultimately it is severe, lancinating, and intermittent.

(*f*) *Surface*—(1) Irregular at first; ultimately smooth.
  (2) Nodular and knotty throughout.
  (3) Smooth.

(*g*) *Consistence.*—(1) Hard and almost stony.
  (2) Resistant and hard.

(3) Irregular, soft, almost fluctuant at some spots, and hard and bossy at others.

(*h*) *Testicle affected.*—(1) Usually both ultimately.
(2) Generally both.
(3) Very rarely more than one.

(*i*) *Epididymis.*—(1) Seldom affected.
(2) Disease begins in it, and it continues affected throughout.
(3) Disease extends to it.

(*k*) *Glands.*—(1) Iliac and lumbar glands not affected; inguinal frequently are.
(2 Same.
(3) Iliac and lumbar glands early affected; inguinal glands only late.

(*l*) *Termination.*—(1) Fibrous or calcareous degeneration or atrophy.
(2) Suppuration.
(3) Ulceration.

(*m*) *Weight.*—Syphilitic and tubercular testis considerably heavier than cancer.

(*n*) *Veins of scrotum* enlarged and tortuous only in cancer.

(*o*) *Fluid in tunica vaginalis* is present as a rule in syphilitic disease and cancer; it is only present exceptionally in tubercular disease.

(*p*) *Curability.*—(1) By mercury and iodine or hydriodate of potash.
(2) Seldom much benefited by treatment; and if so, it is by anti-scrofulous remedies.
(3) Incurable by internal remedies.

**Cystic Disease of the Testes.**—This is a very rare malady. It may be combined either with an enlargement or diminution of the gland. These cysts may be simple or compound; single or multiple; small or of large size; and their contents vary much in their character. There may be masses of enchondroma and cholesteatoma mixed with them, and frequently soft cancer is also combined with such cysts.

Cystic disease becomes slowly developed, and that without pain. When formed its shape is oval or globular, and it is elastic and tense to the touch, and sometimes fluctuant. It is smooth or bossy; rarely uneven. The mechanical effects produced by its bulk and weight may afterwards give annoyance. The veins of the cord are usually varicose.

Its origin and progress; shape (ovoid, not pyriform), size, want of transparency and distinct fluctuation; the weight and condition of the veins of the cord; the absence of pain except from the weight; there being no peculiar uneasiness on pressure where the gland is placed, in fluid collections in the tunica vaginalis; and finally, the effects of puncture—will distinguish this disease from *hydrocele* and *hematocele*.

From *encephaloid cancer* cystic disease often cannot be differentiated, but at other times it is distinguished by its slower progress; by the absence of all affection of the cord and lumbar glands; by the scrotum being free and not laced by enlarged veins; by there being no cachexia or lancinating pain; by its more regular surface; and lastly, by puncture. By using the exploring needle we will be able to distinguish whether it is a cyst or a cancer, and obtain some of the contents for further examination. A puncture should not be had recourse to, however, till all other methods of investigation have failed, and we are prepared to operate if necessary.

**Fungus, Benign, of the Testes.**—A hernia of the gland through the tunica albuginea and scrotum. It varies much in size, being sometimes not greater than a hazel-nut, at other times equal to the size of the closed fist. The whole gland may thus be protruded, so that little, if any, remains behind in the scrotum. The mass is hemispherical, and sometimes lobed. It has a more or less marked neck, bound by the skin of the scrotum. The edges of the aperture through which it passes are thick and everted. There is purulent matter lying in the clefts of the growth, and the cord is felt passing into its base. It has a granular surface of a red or gray colour. It is painless to the touch unless compressed, and then a peculiar sickening sensation is caused. If it is large it may, however, occasion a sense of dragging on the cord, and annoyance therefrom. Before it has come to protrude the pain is very considerable, from the tension that it occasions. Such a growth, though usually springing from the body of the testes (having burst the tunica albuginea), yet occasionally grows from the tunica albuginea itself. The discharge is thin and scanty, and occasionally mixed with semen. The disease is nearly always confined to one testis at a time.

**Malignant Fungus** presents itself as a bleeding exuberant red mass, soft and friable, at some places like cream, growing rapidly, and with severe lancinating pain.

The discharge is profuse, bloody, and fœtid. In size it is often very considerable. The general health is gravely affected. The cord and abdominal glands are implicated.

A *benign fungus* is distinguished from the malignant by—

(1) The history of the one being that of chronic inflammation, and the other that of encephaloid cancer.

(2) The firmness of the one growth, and the soft, friable character of the other.

(3) The one being indolent unless pressed, the other being violently painful.

(4) The malignant growing much more rapidly than the benign.

(5) The discharge being profuse and fœtid in cancer, and scanty and thin in benign fungus.

(6) The malignant bleeding on the slightest touch, and that often profusely; the benign not doing so.

(7) The skin around the protrusion being only thickened, but not participating in the disease, in the benign fungus; but being usually cancerous in the malignant.

(8) The state of the general health in either case.

(9) The condition of the cord and lumbar glands.

The testicle is also liable to *fibrous*, *enchondromatous*, and *calcareous* transformations; to a combination of *fibrous and cystic disease;* or a mixture of *cancer* and *enchondroma*, or *cystic disease ;* and to *hydatids*.

The history of the case; its rise and progress; its consistence and weight; the amount and character of the pain pre sent; and in some cases the effects of puncture—will enable us usually to distinguish these affections.

**THYROID**, Disease of.—Bronchocele. (*a*) Inflammation; (*b*) Hypertrophy; (*c*) Cystic tumours; (*d*) Scrofulous degeneration; (*e*) Cancer; (*f*) Pulsating bronchocele.

All tumours of the thyroid gland lie in front of the neck, occupying either the middle line, or being developed unilaterally or bilaterally, or covering the centre and one side. They accompany the movements of the larynx in deglutition, and this sign distinguishes them from those growths which, though lying near the thyroid, have no connection with its substance. In some of these tumours we have fluctuation apparent. Such fluctuating tumours may either be abscesses, cysts, blood collections, or hydatids.

If there is no fluctuation (always remembering that, in the case of such cysts as have very thick walls, or are very much distended, fluctuation may be very difficult to find), the tumour may be due to inflammation (suppuration not being yet established), hypertrophy, scrofulous engorgement, or cancer.

If there is pulsation observed, it may be inherent in the tumour, as in one form of bronchocele, or it may be acquired from the carotid.

Symptoms referable to mechanical pressure, such as dyspnœa, spasm of the glottis, croaking or suppressed voice, cough, dysphagia, pain shooting up the side of the head, interference with the cerebral circulation (dizziness, congestion of the head and face, headache, epistaxis, &c.), may arise in any case, when the tumour is large enough, or grows in such a direction, as to produce the necessary pressure. Cancerous tumours produce these symptoms when they are of a smaller size than others, from the way they mat together the parts, and from their occasionally penetrating the trachea and œsophagus. Pulsating tumours, also, from their rapid increase, usually quickly produce the symptoms referred to. The enlargement of the superficial veins, too, may attend any of these tumours when they reach a large size; but this sign is more marked in soft cancerous tumours of the thyroid, than in any of the other growths of the gland.

(*a*) **Inflammation.**—Local signs of inflammation and contitutional reaction will be apparent. There is much pain, redness, and œdema of the integuments, the progress is rapid, and it occurs in a healthy person (usually); or it may appear after injury in a gland already diseased. Inflammation of the thyroid is frequently endemic in mountainous countries, with deep and dark and ill-aired valleys. It occurs most usually in females, and is very commonly accompanied or preceded by an anæmic state of the system, and by projection of the eyeballs.

(*b*) **Hypertrophy.**—Affects one lobe; the isthmus, and one lobe; or the whole gland; and sometimes attains a very great size, so much so as to reach the ears laterally, and the pubes below. It consists in an increase of the normal tissues of the gland. It is slow and indolent in its progress, and may remain long stationary without pain or affection of the skin. It has a smooth regular surface for the most part (more rarely bossy and lobulated). The shape varies, according to the part and extent of the gland involved. It is firm and homogeneous, and slightly elastic to the touch, and usually easily defined. There is no fluctuation, crepitation, or pulsation. The superficial veins are distended if the growth is large, but not otherwise.

(*c*) **Cystic Tumours.**—These are variously designated "Serous," "Cystic," "Lymphatic," "Bronchocele," "Hydrobronchocele," &c.

These tumours usually occur in middle and advanced life, and may occupy one or both sides of the gland. They may be combined with hypertrophy, or exist independently. They are painless at first, and are frequently marked by depression in the middle line, bulging out upon either side. The surface is bossy; the skin is unchanged unless thinned; and if the fluid contents be serous, we may have transparency. Fluctuation will be present, unless the wall is very thick, or much distended, or ossification, or cartilaginous deposits (both comparatively rare) exist in the sac. This fluctuation is usually observed at different points of its surface. There is much elasticity; occasionally there is a uniform softness and elasticity as if a spongy mass lay beneath. There are sometimes hard masses of bone or cartilage in the substance of the tumour. If punctured, the fluid contents (which may vary much in character) flow out, and may be succeeded by arterial blood exuding from the walls of the cyst, but flowing so copiously as to lead to the erroneous idea that an aneurism has been punctured.

(*d*) **Scrofulous Degeneration.**—This is very rare. It is chronic and painless. It occurs in young subjects, with probably indications of phthisis in the lungs. It attains a considerable size, yet gives rise to little or no annoyance, except from its bulk, and from the formation of abscesses in its structure, and the fistulous tracks which these abscesses leave behind after they burst. The tumour is irregularly lobulated; and the lobes are of different degrees of consistency to the touch. There are sometimes small isolated lobules projecting from the main mass. They are elastic and resistant to the hand.

(*e*) **Cancer.**—Very rare. It usually occurs in consequence of the thyroid becoming involved in the malignant disease of a neighbouring part.

*Scirrhus* occurs in persons beyond middle age, and is usually rapid in its progress. It is commonly small, very hard, with an irregular surface, not projecting much, but spreading out laterally. It is bound down and firmly fixed to the underlying parts. The skin after a time is affected. It becomes changed in colour, and bound to the surface of the tumour. There is occasionally ulceration and a cancerous sore established. There is pain of a lancinating character shooting up to the head, together with progressive emaciation and cachexia. The glands of the neck and axilla are affected.

*Medullary*, softer to the touch, not so irregular on the surface. Elastic, with points of fluctuation. The sub-cutaneous veins are much enlarged. It is very rapid in its progress, and painful. There is frequently similar disease elsewhere, and the neighbouring glands are affected.

In any form of cancer the effects of pressure are usually very marked; and if the disease penetrates the windpipe or œsophagus, a train of symptoms of a very distressing kind will follow, and characteristic shreds of the disease may be brought up.

(*f*) **Pulsating Bronchocele.**—"Aneurismal Bronchocele." Sometimes combined with cystic bronchocele. A species of erectile tumour.

There is an excentric pulsation synchronous with the heart's beat. It is short, sharp, and tremulous. The tumour increases rapidly, and very quickly comes to affect neighbouring parts by its pressure. The pulsation of all the vessels in the body may be found augmented in those cases.

The affections with which these various tumours may be confused are aneurism of the carotid; inflammation and abscess of the cellular tissue, round and in front of the thyroid; hydatid, or other cysts, in the cellular tissue; engorgement of the lymphatic glands, and lipomata.

(1) It is when a tumour of the thyroid so projects, as to derive an impulse from the carotid, that the mistake may be made of supposing that we have to do with an *aneurism*. But if the tumour is raised from over the vessel, the head being bent forwards, so as to relax the parts, or if the tumour is examined when raised by the movements of the trachea, we can free it from the pulsation of the artery. Again, in tumours of the thyroid, the isthmus being usually affected, as well as the lobe which projects over the artery, the central portion will be more firmly fixed, more stable, than the outer part; while in aneurism the firmest part of the tumour is that which is outside, in the line of the vessel below the sterno-mastoid. Lastly, aneurismal tumours of the carotid do not move with the larynx.

(2) *Inflammation and abscess.*—This is attended by acute pain, red skin, and œdema. It is more diffused than a tumour of the gland, and does not form a distinct projection. It is less firm, less limited, and it quickly ends in abscess, when there will be fluctuation. It does not rise with the larynx.

*Cysts* in the cellular tissue; *engorgement of the lymphatic glands*, and *lipomata* are fixed, and receive no motion from the larynx.

Cysts, besides, present the characters described under tumours. Engorgement of the lymphatic glands begins usually at several distinct centres, and spreads in all directions; and lipomata are indolent, have a doughy feeling, and grow slowly, and without annoyance, except by their bulk. The skin over them is unaffected. Cysts, too, may be punctured with a needle. Their precise nature cannot otherwise be determined. They are occasionally transparent, and fluctuate. It is always to be remembered, however, that, in such cases, blood may flow freely from a simple cyst, after its contents have been evacuated.

**TONGUE.—A. Inflammation.** Glossitis.—This may be either superficial, implicating the mucous membrane alone, or deep, pervading the whole parenchymatous tissue. It may give rise to such great swelling that the organ can no longer be retained within the mouth. The tongue becomes tender, hot and red, and mechanically embarrasses both breathing and swallowing. The face is congested, and the brain suffers from its circulation being impeded. Saliva flows in greater or less profusion from the mouth. Speech is almost or altogether impossible. The tongue gets covered with lymphic effusion, and ulceration quickly appears. It is not in recognizing the affection that any difficulty arises, but in discovering its cause. This may be—

1. Idiopathic, from cold, gastric disturbance, or the suppression of some cutaneous discharge. It is in persons beyond middle life, of full habit of body and feeble health, that glossitis from such causes is met with, and in these cases it usually sets in suddenly.
2. From the action of steam, boiling water, chemicals, &c.
3. From wounds or foreign bodies, stings of insects, &c.
4. In ptyalism, from the effects of mercurial or other poisons, mineral, vegetable, or animal.
5. From hacks in its substance, being irritated by the contact of acrid matters or sharp teeth.
6. From extension to the tongue of inflammation seated in the gums or jaws, tonsils, palate, &c. Sometimes glossitis accompanies the exanthemata, especially small-pox.

7. And lastly. It occasionally arises during the decline of low fevers.

**B. Ulcers.**—These may depend on many causes.

1. Inflammation; thrush; aphthæ; scurvy; scrofula; mercurial stomatitis; exanthematous or low fevers; indigestion, especially acidity, may all produce ulcers on this organ, and the recognition of their true character is seldom difficult. The history (origin, progress, and continuance); the accompanying symptoms; the constitution and state of health of the patient; and the absence of any other cause, combined with the effects of treatment, will enable us to diagnose them.

When ulcers arise from chronic dyspepsia, they are usually small, irregular, and painful sores, with a yellowish surface, not spreading much, and they are generally of considerable standing. The tongue is often much congested at the same time. These sores are placed upon the tip or below the tongue, and sometimes in the middle line. The tongue is soft, flabby, and covered with a yellow fur, and marked along its edges by the teeth. Frequently it is chapped and fissured also. There is much fœtor of the breath and other evidence of deranged digestion.

*Aphthous* sores occur in children. They are flat, round, or oval sores, following the rupture of the vesicles. They are well defined—have a bright areola round them—are sometimes large, usually in clusters, and the mucous membrane of the tongue (and gums also, in most cases) is red, and the saliva profuse. They are generally placed near the lip, and may occur in crops, and are associated with intestinal irritation.

When the ulcers are connected with *mercurial stomatitis*, there is the peculiar smell, and dirty deposits on the teeth; there is also the fact that the metal has been recently taken, and the gums will also be affected. The ulcer itself is not usually deep; it is of a bluish lead colour, of irregular shape, and situated chiefly at the edges.

The scrofulous sore forms over hard, elastic, ill-circumscribed tubercular masses set in the tongue, which slowly suppurate. It is deep, foul, and irregular, with high undermined edges.

They are very chronic, and the tongue gets thick and heavy. The patients are evidently strumous, and the sores heal under anti-scrofulous treatment.

2. **Local Irritation**, as from a carious or sharp tooth. The sore is on the side of the tongue opposite to a tooth (usually a molar) capable of causing such irritation. The patient is frequently aware of having (by no means always, however) suffered from the irritation of a tooth. The sore is generally irritable, sloughy, dirty, and deep. If the irritation is long continued, the base may get hard, and the sore simulate a cancerous one (of which the irritating tooth may be the localizing cause), but the induration is never so extensive or great; the rest of the tongue is free of disease; the glands below the jaw, though irritated, do not so enlarge and become hardened as in cancer; and there is the local source of irritation present, and we observe that the general health does not suffer in the same way.

3. **Syphilitic Ulcers.**—May be primary, secondary, or tertiary.

(*a*) *Primary* occur on the tip or near the point. They are rare. In shape they are round, punched out, and have a hard base. They are solitary. There are rolling, indurated, indolent glands below the jaw. The sore begins to heal, on an average, in a fortnight, and is followed, almost certainly, by constitutional disease.

(*b*) *Secondary.*—These are small superficial abrasions, usually forming over mucous papules. They have copper-coloured surroundings, and are not nearly so common as the tertiary sores.

(*c*) *Tertiary* ulcers may form on any part of the tongue, and may be placed so far back as only to be discovered by the aid of the laryngoscope. They may occur as a raw, superficial, red, or pale patch merely, or as deep, irregular, and foul sores following a gummy tumour or a mucous papule. They are generally multiple, painful, slow in their progress, and of oval or irregular shape. They are frequently placed along the edges of the tongue, and have comparatively little hardness at their base. Sometimes they occur as fissures or hacks, and are irritable, hard-edged, and painful.

4. **Cancerous Disease.**—May occur in the tongue in any of its different forms, but the epithelial is by far the most common. Malignant disease may be either superficial or deep, and may be accompanied or not by ulceration.

(*a*) When no ulceration exists, the disease may present itself to us, either as small granular masses disseminated over the organ; or as flat, sessile, dusky swellings; or as pedunculated (rare) tumours.

(*b*) When ulceration is present it may occur as flat purple sores, such as are above referred to, or as a fissure or hack.

When formed the cancerous ulcer has the following characters:—It is a deep, irregular, foul sore, with hard, everted, ragged edges. The base is very hard, coarsely granular or nodular, and extends for some distance from the sore, there being also probably other points of induration in the tongue, and possibly the whole organ may be hard to the touch. There is a profuse discharge of fœtid sanious matter, mixed with cancerous debris. There is free salivation, and the patient has much difficulty in expelling it from the mouth. The pain is usually considerable, and shoots up to the ear and forehead. The sore soon begins to spread rapidly, and the floor of the mouth and the pillars of the fauces become affected. Deglutition and speech are impeded, and the patient can with difficulty be nourished. There is repeated hæmorrhage. The sub-maxillary glands become early involved, and those at the back of the neck also participate. Cachexia sets in, and there is much emaciation.

These sores are distinguished from simple sores by their history, their appearance, their foul and deep character, their hard base, the affection of the glands and general health, the absence of such causes as may give rise to simple ulcers, the age of the patient (cancer occurring usually, but by no means always, in the old), the steady progress, and the implication of neighbouring parts. Further, an examination under the microscope of the scrapings, and the effects of treatment, will aid the diagnosis.

In cases of doubt we must remove every possible source of irritation (sharp teeth, smoking, articles of diet, &c.) in the mouth or digestive organs, and wait.

From *tertiary syphilitic sores* the distinction is often very difficult, but the pre-existence of primary and secondary syphilis (this history, if it exists, is most valuable; but if absent, it is not by any means conclusive against the supposition that the sore is syphilitic); the co-existence, probably, of other evidences of syphilis; the absence of the same amount of induration that exists in cancer, and the edges not being so hard, nodular, and everted; and the parts around being smooth, and not warty. There are generally several syphilitic and only one cancerous tumour. Further, there is the glandular affection (absent, or little marked, in tertiary syphilis), and the peculiar pain and cachexia in cancer. Syphilitic disease seldom or never spreads to the floor and inside of the cheeks; there is not the same general induration, or masses of induration, in other parts of the tongue, as in cancer, in which, too, there is much more profuse discharge—which discharge, too, is of a sanious fœtid character; and lastly, the scrapings of the sore examined by the microscope, and above all the effects of treatment—will throw important light on the subject. It may be added, that the syphilitic sore is commonly seen in younger patients than the cancerous.

The tubercular masses, which occur in cancer before ulceration has set in, are distinguished from those seen in syphilis, by their being commonly single; by their quickly ulcerating; by the hardness at their base; by the affection of the glands below the jaw; by their being placed, for the most part, at the edges and tip of the tongue; while the syphilitic are slow and indolent in their progress; have frequently the epithelium removed from the surface; are usually multiple; of a dark coppery colour and deep set, and accompanied by other evidences of syphilitic disease; and are probably combined with similar tumours on the tonsils and inside of the cheeks.

The tongue is subject to various kinds of growths, besides those above mentioned. Erectile tumours, abscess, anthrax, cysts, fibrous, fatty, and fibro-cellular tumours; but all of these are recognized by the usual symptoms and characters of such growths in other parts.

The highly vascular nature of the *erectile growths;* their long existence; their appearance shortly after birth; the tremulous pulsation in them; their consistence; their raspberry or strawberry-like appearance; and their action under pressure and effort (diminishing or disappearing in the former case, and augmenting in the latter), distinguish them.

*Acute abscess* is preceded by symptoms of inflammation, and though hard at first, gets soft as suppuration becomes established.

*Cysts* are round, fluctuant, or elastic bodies, painless, situated for the most part at the tip or sides of the tongue, and a puncture will clearly reveal their nature.

*Psoriasis* occurs as a dry, hard, scaly affection, usually associated with a squamous eruption of the skin. It covers the whole surface, or creeps along, healing behind as it spreads in front. Sometimes it presents itself as white irregular spots of varying size. It is usually syphilitic.

**TUMOURS.**—Divided into—

A. **Simple.** Innocent. Benign.
B. **Recurrent,** or Semi-malignant.
C. **Malignant.**

The recurrent tumours occupy an intermediate position between simple and malignant growths, the distinctions between which are as follows.

It must, however, be premised that the points of contrast between simple and malignant growths, below noted, can only be considered as applying in a general way, and thus representing the *general*, not the *universal* rule. None of them are individually distinctive or characteristic; but if several of them are found conjoined, then they may with safety be relied upon.

Simple tumours are mere local affections, for the most part arising from temporary errors of nutrition; while malignant tumours are "local manifestations of some specific morbid states of the blood."

| **Simple.** | **Malignant.** |
|---|---|
| (1) *Intimate* | *Nature.* |
| Analogous; homologous; homomorphous. Similar to some of the fully developed natural structures of the body. | Heterologous; heteromorphous. Unlike any fully developed natural structure. Different, too, in the groupings of their constituents from those natural structures which they most closely imitate. |

(2) *Connection with surrounding parts.*

| | |
|---|---|
| Comparatively slight. It is "set" in the tissues, but not closely or intimately amalgamated with them. | Often infiltrated into the tissues of the part. Pervades, mixes with them, or by degrees works up these tissues into their own structure. |

(3) *Multiplicity.*

| | |
|---|---|
| Frequently single; and if multiple, restricted in their development to one texture. The several growths start into life together, and grow co-ordinately. | They tend to reproduce themselves contemporaneously, or in succession, and that in many parts and textures often at a distance from the original growth. |

(4) *Progress.*

| | |
|---|---|
| Slow; frequently stationary, after attaining a certain size. | Usually grow with rapidity. |

(5) *Ulceration.*

| | |
|---|---|
| Have no *tendency* to ulcerate or protrude, though they may, under certain circumstances, do so. The structures around and beneath the sore which results when ulceration does take place, are healthy, or merely changed by inflammatory exudation, and unless sloughing set in the ulcer will be confined to the tissues first affected. The sore will heal if the distension, or irritation, or inflammation produced is allayed or removed; and if the growth is once completely penetrated by ulceration, it is finally and for ever destroyed. | *Tend* to ulcerate, and the edges and floor of the sore are cancerous. The ulcer has no inclination to heal; but, on the contrary, always tends to spread. Though constantly throwing off diseased tissue, the morbid matter is rapidly reproduced. The more rapid and extensive the ulceration the greater the development of the disease. |

(6) *Constitutional implication.*

| | |
|---|---|
| None in innocent tumours. | Sooner or later appears. |

Innocent and malignant tumours may co-exist in the same person, or they may be even mingled; but they are never converted the one into the other, although, from malignant tumours growing upon the previous seat of innocent tumours, it may occasionally seem as if the innocent was converted into a malignant growth.

## A. SIMPLE, INNOCENT TUMOURS.

Divided into (I.) Cysts, and (II.) Solid Tumours.

A third class might be formed of those growths in which cysts are combined or commingled with solid growths; but the characters of such tumours will be best brought out when considering individual growths.

(I.) **Cysts.**—Divided into *simple* or *compound*.

(1) SIMPLE OR BARREN CYSTS are just sacs filled with fluid or unorganized products. There is a great variety in the consistency, and the physical and chemical characters of simple cysts, and consequently the feeling communicated to the hand in their examination. They are usually well defined, round or oval, regular, and movable. They are not deeply set. They grow slowly and painlessly, and without producing any disease in the surrounding parts.

They are formed either by the dilatation and hypertrophy of a closed excretory duct; the expansion of the meshes of the areolar tissues in the sub-cutaneous or inter-muscular spaces; or the growth of a new elementary structure in the part.

*Site.*—They may occur in all parts nearly of the body. On the external surface, they are met with—

In the *scalp and eyebrows*—cutaneous.
In the *neck*—serous, sanguineous, and colloid.
In or near *glands*—serous, sanguineous, oily, mucous, colloid, and seminal.
In the *bursæ*—synovial.
Near *mucous membranes*—mucous.
In *bone*, *muscle*, *and nerves*—serous.
In the *spermatic cord*—sanguineous and seminal.

(*a*) *Serous.*—Contents consist of serum more or less changed. These cysts may be congenital, or appear late in life. They are smooth, regular, round, or oval tumours; circumscribed; elastic or fluctuant, according to their distension, the depth they lie from the surface, and the thickness of their walls. They are not closely connected or bound to the surrounding parts. They grow slowly and without pain. If prominent, and their parietes thin, they may be transparent. The adjacent and overlying parts are sound and unchanged.

*Site.*—The neck, frequently at the sides or above the clavicle ("hydrocele of the neck"); near glands or glandular tissues (thyroid, parotid, mamma, testicle, kidney); in the subcutaneous tissues, almost in any region; in bone and muscle, and nerve; in the gums and in the orbit. They may be single, or may consist of several communicating cavities superficially or deeply placed.

Cysts in the mamma may be frequently partially emptied through the nipple.

Serous cysts may be combined with medullary cancer, and then they grow rapidly, and often attain a great size.

Serous cysts are recognized by their site, history, progress, and physical characters, as given above.

*Acute abscess* can hardly be confounded with such a cyst, as it is preceded and accompanied by local inflammation. A *chronic abscess* has thicker walls, is harder to the touch, and is commonly more deeply placed. Finally, an exploratory puncture may be had recourse to if necessary.

(β) *Synovial Cysts.* See BURSÆ (natural or accidental).

(γ) *Mucous Cysts.*

*Site.*—In or near mucous membranes, or mucous glandular structures. These cysts present the same physical characters as serous cysts—the positions in which they appear alone distinguishing them. (*See* RANULA and ANTRUM.)

(δ) *Sanguineous Cysts.*—These may be congenital, or appear late in life. They often form in connection with nevus, and veins may communicate with their interior.

These cysts are, in some instances, sanguineous from the outset; while in other cases they are formed by hæmorrhage into serous cysts following injury.

*Site.*—Neck, spermatic cord, pubes, thyroid, parotid, and wherever serous cysts occur. They may be combined with soft cancer, and grow to a great size. They have the same physical characters as serous cysts. They are usually single, and may dip deeply among the tissues. They can frequently only be diagnosed by puncture.

(ε) *Oily Cysts.*—These are very rare; so rare, that for practical purposes they do not require consideration. They occur chiefly in the breast.

(ζ) *Colloid Cysts.*—These contain fluids more or less like glue, or honey, or jelly; but their contents vary considerably in colour and in consistency. They are often combined with soft and other cancers.

*Site.*—They may be met with anywhere, like serous cysts; but are chiefly formed in connection with the thyroid gland and kidney.

(ε) *Seminal Cysts.* See TESTICLE and SPERMATIC CORD.

(2) COMPOUND OR PROLIFEROUS CYSTS.—These contain organized structures, and so differ from simple cysts. Their contents may be vascular, cystic, glandular, or malignant.

*Site.*—When containing vascular or glandular growths, they are chiefly met with in the ovaries. They occur in or near glands or glandular structures, as the mamma, thyroid, prostate, lip, &c.; but they may also lie between the muscles and in the sub-cutaneous tissues of the body.

In shape, proliferous cysts are round or oval, and they may be slightly lobed. It will depend on the relative proportion of fluid and solid contents whether they fluctuate, are elastic, or feel solid. At one part of their surface they may present the features of a solid growth, and at another part the characters of a fluid tumour, according to the relative position of their contents. They are movable and circumscribed; and as the solid growth may, after filling its containing cyst, come to burst through both it and the overlying parts, it may protrude and form a fleshy mass on the surface. The fungous tumour thus formed has a granular surface; but there are no indications either at the part itself, or in the glands, or in the general health, of its exerting a malignant action. It is only by its position and physical characters, as above stated, and its slow growth and progress, that we can form any opinion of the nature of such a tumour. In many cases we will be quite unable to diagnose these growths with any certainty, from various soft, solid tumours, and from clustered simple cysts.

(α) *Cutaneous Cysts.*—These are round, or oval, or flattened, smooth, regular, doughy, or elastic, movable, and painless tumours, which increase slowly, and without affecting the healthfulness of the parts around. These tumours may be congenital or not.

*Site.*—Ovary, testicle, bladder, kidney, lung, below the tongue, within the skull, and in the sub-cutaneous tissues. It is on the eye-brow, and near the orbit, that the congenital form is chiefly met with. They also occur in the jaws. The non-congenital is most frequently seated on the scalp and shoulders.

In many cases the exact recognition of the congenital cutaneous cyst—its distinction from other cysts—is impossible. The non-congenital cyst often presents a small black point on its surface, which marks the aperture of the closed duct, and through this opening the cheesy contents may occasionally be squeezed. These cysts are common in women about middle age, and may be very numerous upon the same patient.

Non-congenital cutaneous cysts occasionally ulcerate, and produce a dirty, elevated, bleeding, irritating sore, with hard and everted edges, and sanious discharge, which in old persons might be mistaken for cancer. It is by their history and site that they are to be distinguished, and by the absence of those constitutional characters which mark cancer.

The *horns* occasionally met with on the human body result from the constant exudation and drying of the contents of cutaneous sebaceous cysts.

A cutaneous cyst is distinguished from *chronic abscess*, and from *nevus*, by its history, by its being firmer, less puffy, and not varying in size; by the colour of the surface being unchanged, and by the influence of compression on it; lastly, there is no impulse in the cyst.

The general cystic character of these growths; their subcutaneous position; their shape, mobility, slowness of increase (sometimes becoming stationary; and in rare cases, after such arrest, undergoing rapid augmentation); their painlessness; the speck, in many cases on their surface, marking the opening of the duct; their doughy feeling, and the surrounding parts being unaffected—are the points most worthy of note in their diagnosis.

The contents of the non-congenital cutaneous cyst are generally soft, whitish, or yellowish, cheesy, sebaceous substances, charged with epithelial and cholesterine scales, fat granules, &c., &c. Occasionally they inclose calcareous matter, either dry or semifluid, and the smell on opening old cysts may be most nauseous. The nature of the tumour can be verified by a microscopical examination of their contents.

Non-congenital cutaneous cysts are distinguished from lipomata and abscesses by their history and site; also in many cases by their size, and the sensation which they communicate to the hand.

(β) *Dentigerous Cysts.*—Occur in the ovary and jaw, and cannot be distinguished before removal from other cysts.

(II.) **Simple Solid Tumours.**—Fatty; fibro-cellular; fibrous; cartilaginous; myeloid; osseous; glandular; and vascular.

These growths may occur in any of the structures of the body, and they vary much from one another in their physical characters.

*Site.*—On the *trunk* and *limbs.*

In the *skin*—fibro-cellular outgrowths.
In the *sub-cutaneous tissues*—fibro-cellular, fatty, fibrous, cartilaginous, myeloid, and vascular.
In the *inter-muscular spaces*—fibro-cellular.
In the *bones*—fibrous, cartilaginous, myeloid, osseous.
In the *nerves*—fibrous.
In the *nostrils*—fibro-cellular, fibrous.
In the *uterus*—fibrous, myeloid.
In the *jaws*—fibrous, myeloid.
In the *pharynx*, *œsophagus*, *and larynx*—fibrous rarely.
In the *parotid*—cartilaginous and fibrous.
In the *thyroid*—myeloid and glandular.
In the *breast*—cartilaginous (rare), myeloid, glandular, and fibrous.
In the *labium and vagina*—fibro-cellular.
In the *scrotum*—fibro-cellular.
In the *testicle*—fibrous and cartilaginous.

(α) *Fatty outgrowths and tumours.*

*Site.*—The outgrowth may occur anywhere, but is chiefly met with in the neck and abdomen.

The tumours may occupy any position, except the palms and soles; but it is upon the upper half of the trunk, and the limbs near the trunk, that they are most frequently met with.

The fatty tumour is generally single, but they may be numerous, especially on the arms. They are sessile or pedunculated. They are often narrow stemmed and pendulous, and indistinctly and largely lobed. They arise without any ascertained cause, though they are occasionally referred to injury. Usually the skin is indented, when it is stretched, at the point of union between the lobes of the tumour. They are round or pear-shaped, smooth, movable, and not fluctuant. They are firm, elastic, spongy, and painless; and though occasionally capricious in their growth, they usually increase slowly, and the overlying and surrounding parts are healthy. They occasionally slowly shift their position to a more dependent point, and this may be a very useful aid in recognizing them in some cases. They may have indurated and even bony masses in them, and also cysts. Occasionally fatty tumours suppurate, and slough when large or injured, and then they may protrude, without, however, any appearance of malignancy.

When superficial, these tumours are easily recognized. If they are deeply placed they cannot be distinguished from various other simple solid growths.

From *chronic abscess* and *cysts* fatty tumours are diagnosed, by their having no fluctuation (a character, however, it must be admitted, which, in some cases, it is impossible to distinguish from the soft spongy feeling of fatty growths), and by the exploring needle, which, in a case of doubt, should always be had recourse to; and from *soft cancer*, by their history and progress.

When multiple, fatty tumours are distinguished from *neuromata*, by their position, less firmness, movability in all directions, and their less uniform size.

(β) *Fibro-cellular* outgrowths and tumours.—The former are more common than the latter.

*Site.*—Outgrowth. Hypertrophy of the skin, of the scrotum ("Elephantiasis"), the labia, prepuce, nymphæ, clitoris, &c.

Tumours.—These may occur in any region. They present themselves occasionally as polypi in the nose; pharynx; œsophagus (rare); larynx (rare); antrum (which see); rectum (which see); uterus; bladder (rare); ear; scrotum (which see); labia (which see); walls of the vagina; sub-cutaneous tissues and deep inter-muscular spaces of the limbs; occasionally, too, in the sole of the foot, the orbit, and the tongue.

When confined to the skin these fibro-cellular outgrowths form firm and whitish pendulous masses, non-elastic and tough. Occasionally they are softer and more succulent. Sometimes they are surcharged with fluid.

As tumours fibro-cellular growths are presented to us as round, oval, or lobed, firm, smooth, uniform, or deeply lobed, and elastic masses, growing moderately slowly, and without pain. In rarer cases they increase rapidly, and are attended with ulceration and sloughing. In these cases the ulcerated mass may bleed freely.

Fibro-cellular tumours arise without apparent cause. They are usually seen at or about middle life, and in healthy persons.

In many cases we have no means of recognizing these tumours, except from such uncertain indications as are afforded by their site, the feeling they communicate to the hand, and their progress; and thus they may be confused with fatty and various cystic tumours, and it may be with chronic abscess. Their history and progress should differentiate them from soft cancer.

Fibro-cellular growths occasionally undergo rapid, but temporary increase, from mere œdematous swelling, and this is not to be confused with rapidity of growth.

Fibro-cellular tumours present on section a yellow, or greenish-yellow, succulent basis substance, traversed in circles or wavy lines by white opaque bands, which may form mere lines on the surface of the section, or constitute partitions to the tumour. A yellowish fluid exudes, and some parts are softer and more juicy than others. Portions may be broken down by degeneration going on within the substance of the tumour, and masses of cartilage are, in rare cases, found embedded in its structure. Under the microscope filamentous tissue is found mingled with nuclei and elongated cells.

The *painful sub-cutaneous* tumour, which is a fibro-cellular growth, is easily recognized from its sub-cutaneous position; its solitariness; its small size; tense, elastic feeling, and the violent neuralgic pains of which it is the seat. The pain in these tumours constitutes their most marked feature. It is occasionally periodic, and is not constant. It may be so excessive as to cause spasms, and even general convulsions. It is aggravated by slight causes, and by anything which excites the nervous system. It is also augmented by uterine irritation. It increases in intensity to a certain height, and then diminishes. It may last only a few minutes, or may continue for hours; and no sufficient cause in its anatomical structure can be found to account for it.

The painful sub-cutaneous tumour is met with chiefly on the limbs of adult females.

(γ) *Fibrous* outgrowths and tumours.

*Site.*—In the uterus (most common seat); nerves (where they may be very numerous); nose; antrum; pharynx; œsophagus and larynx as polypi; the lobe of the ear after piercing; the mamma (rare); antrum and parotid region; the periosteum in connection with the jaws; near joints; in the sheaths of tendons, and in the sub-cutaneous and sub-mucous and deep fibrous tissues generally.

In consistence fibrous growths may vary considerably, from firm fleshy masses, to hard, dense, heavy, and incompressible tumours. They are round or oval; smooth or lobed (chiefly so in the uterus); painless, and frequently moulded into the part in which they lie, if the boundaries of the part are firm enough so to mould them. The rapidity of their growth will depend a good deal on the resistance offered to them by the parts around. Generally they increase slowly.

Single or numerous cysts may grow within fibrous tumours, and occupy the greater part of their bulk; and calcareous deposits may also occur within their substance ("fibro-cystic" and "fibro-calcareous" tumours of some authors); so that when the tumour is macerated, a coral-like branching structure remains.

Fibrous growths are usually single, except in the uterus and in the nerves, where they are frequently numerous. They may attain a great size. They are movable; but the under side of the cutis is often firmly bound to their surface. If irritated, fibrous tumours may grow quickly, and burst through the overlying parts; and give rise to a bleeding, sprouting growth, unlike any other innocent tumour.

The section of such a tumour is firm, tense, convex, sometimes lobed, of a gray, nearly homogeneous colour (occasionally yellow, brown, or blue), traversed by white bands, waving, or in complete or incomplete circles crossing and interlacing. Occasionally these bands are indistinct, and the fibrous structure barely recognizable. Sometimes spiculæ of bone or masses of cartilage occur in them; and they may be softened, broken down, or calcified.

Under the microscope, slender fine filaments, variously developed and grouped, are seen intermingled with nuclei and cyto-blasts in varying numbers. Possibly elastic and muscular fibres may also be found, and traces of cartilage or bone.

Fibrous growths yield gelatine on boiling. It is by their firmness, their seat, their slow growth, their weight and outline, their painfulness and mobility, that we recognize fibrous tumours. If they ulcerate and burst, the tissues around are not changed, except by irritation and inflammatory deposit. The glands are not diseased, and there is not the same deep cachexia as in cancer. In many cases the diagnosis of fibrous tumours from other firm benign tumours is impossible before excision; and this remark refers equally to the softer and the harder species of fibrous growths.

Fibrous tumours, when situated on the jaws, constitute one species of epulis (which see).

Fibrous tumours are not so common on bone as the cartilaginous, myeloid, or the medullary tumours.

(δ) *Cartilaginous tumours.*—Enchondroma.

*Site.*—In connection with the bones (external or internal to them), which they expand, or perforate, or surround under the periosteum.

Cartilaginous tumours may occur on any bone; but it is chiefly on the bones of the hands (where they may be very numerous), the last phalanx of the great toe, the lower end of the femur and upper end of the tibia, humerus, ribs, and pelvis, and rarely on the jaws and skull, that they are found. They may surround the shaft of a long bone, and stop abruptly at its articular extremity, which they seldom invade. These growths are, however, in rare cases met with in the tissues or glands, as in the mamma (very rare), testicle, parotid, submaxillary glands, and in the sub-cutaneous tissues, inter-muscular spaces of the neck and lower limbs, and in the lungs.

Cartilaginous tumours are hard, firm, frequently lobed, round, or oval, or flat masses. Occasionally they are only highly elastic and compressible, not actually hard. They begin (especially on the hands) in early youth, as a rule; though in the neck they may appear late in life. They may be hereditary. They are slow of growth in general; though in some of their rarer forms, cartilaginous tumours increase rapidly. They may become stationary, especially at manhood; or they may go on to reach an enormous bulk. They may partially or wholly ossify, then their weight and hardness are increased.

On section, a cartilaginous tumour is found to cut crisply, and to resemble fœtal cartilage, both to the naked eye, microscope, and chemical tests. The section is frequently divided into lobes by the periosteum. The basis substance is of a glistening, opaque, or semi-translucent compact character, and of a grayish, bluish, or pinkish white colour; firm and elastic to the touch, usually resistant, but occasionally soft, and almost diffluent. Occasionally the section is coarsely granular.

Cartilaginous tumours may be mingled with glandular, fibrous, myeloid, or bony growths, and with cancer (especially in the testicle).

Cartilaginous tumours are sometimes full of cysts; and may be in part, or throughout the greater portion of their extent, broken down into a jelly-like consistence of a yellow or pink colour. In such cases they are very apt to be mistaken for colloid cancer. The microscope will, however, differentiate them. There may be portions, also, of the tumour which have undergone fatty or calcareous degeneration; and these will be yellow, or white and greasy, or dry and powdery.

A consideration of the site, hardness, resiliency, and progress of these tumours will be our means of recognizing them. They can hardly be confounded with scirrhus in the mamma, as they are very rare in that gland; and a solitary scirrhous tumour is almost unknown anywhere else. They are more elastic, and not so heavy, as bony tumours. If combined with cancer, then the malignant tumour will take the lead. Many of the cases recorded as recurrent cartilaginous tumours have doubtless been of this mixed description.

(*i*) *Myeloid tumours.*—"Fibro-plastic;" "marrow-like."

*Site.*—These tumours only form in connection with bone as primary growths. Occasionally, however, they are met with in the mamma, and it is said in the neck near the thyroid and parotid; in the jaws (*see* EPULIS); in the eye, brain, uterus, rectum, nose, hands, and feet; and in the sub-cutaneous tissues.

Myeloid tumours present various degrees of consistence to the hand. They are rarely so firm and resistant as fibrous growths, nor so soft as the more common species of fibro-cellular. Generally they are resistant, softly elastic, bruisable to the touch; but they may be semi-diffluent like jelly, and they may, in rare cases, pulsate. They commonly occur in young persons; grow slowly and painlessly, and without evident cause. They are single, and have no tendency to ulcerate or protrude. They may be partially (and almost wholly) occupied by serous or sanguineous cysts; or be to some extent ossified; or they may be mixed with soft cancer. The growth of a myeloid tumour may be steady, or it may become stationary, or even shrink.

On section, a myeloid tumour is smooth, shining, compact, uniform, and succulent. The basis substance is grayish-white, or of a greenish hue; and it is sprinkled over, or partially, or even wholly stained, by pink or brown blotches. This staining occasionally converts the whole surface of the section into a plum-like colour. Usually the tumour is succulent, brittle, and exudes a yellowish fluid.

Myeloid tumours, from their connection with bone, are most apt to be confounded with fibrous growths; but they are not so hard and resistant, and they are more vascular than fibrous tumours. The exact nature of the growth cannot frequently be definitely determined till it is removed. Its slower and more painless progress; the absence of all gland implication and cachexia, will distinguish myeloid tumours from cancer in most cases.

(ζ) *Osseous tumours.*—This tumour is, probably, in most cases, formed by the ossification of a cartilaginous or myeloid growth—the former being capable of complete, and the latter of partial ossification. These growths may consist of compact ivory-like, or cancellous bone.

*Site.*—In connection with the bones, and in very rare cases, they have been found disconnected with bone, and lying in the soft tissues. Ivory-like osseous tumours are usually seen on the skull, and especially on the superciliary ridges. The skull may be perforated by these growths, as they may begin within the skull and grow outwards, or occupying the frontal sinuses, grow in both directions at the same time.

Osseous tumours are occasionally seen on the long bones, and they may have thin stems. They have been met with on both condyles of the femur; on the humerus and jaws; on the end and inner margin of the last phalanx of the great toe, where they may form a short branching projection under the edge of the nail ("Dupuytren's exostosis").

Osseous growths may be very numerous in the same person, or they may be solitary. They are occasionally symmetrical in their development. They are hard, smooth, but more commonly nodular (the projections being sometimes sharp), heavy, and very slow in their growth. They may attain a great size. They occasionally, but rarely, spontaneously slough off.

These growths are easily recognized by their site, hardness, fixture (when attached to a bone), and weight.

(η) *Glandular tumours.*

*Site.*—Near a gland, as the mamma (see p. 351); prostate (see p. 380); thyroid (see p. 450); lips (see p. 343); and it may be in the lymphatic glands.

The characters of these tumours have been sufficiently dwelt on, in considering the affections of the different regions where they occur.

(*l*) *Erectile or vascular tumours.* See Nevi.

These may be superficial or sub-cutaneous, or lie deep between muscles. They are congenital, or appear in early life. They are sometimes combined with cysts and with cancer.

The cutaneous are easily recognized; but when erectile tumours lie deeply, they are not so easily distinguished. Their being probably congenital; their varying size in different positions of the part; the influence which a state of fulness or emptiness of the veins has upon the tumour, if it be of the venous specie of erectile tumour, and the presence of pulsation in it if it be of the arterial description; the doughy, pulpy, puffy feeling which they present to the hand; their being compressible, and filling slowly after they have been emptied—are the characters by which we recognize them.

## B. RECURRENT OR SEMI-MALIGNANT TUMOURS.

These tumours have the structure of simple growths; but they have the progress and the effects of malignant tumours. They are "malignant," though not "cancerous." They are "anatomically benign, but functionally malignant."

Those tumours which are liable to recur are the soft, incompletely developed forms of cartilaginous, myeloid, fibrous, glandular, fibro-cellular, and certain proliferous cysts. It is, however, especially a species of fibrous tumour (" the recurrent fibroid") which falls to be ranked under the class of growths which are now referred to.

*Site.*—Anywhere the analogous simple tumours occur. It is at the upper and outer aspect of the leg, on the shoulder, and scapula, that they are probably most often met with.

These tumours recur in or near the same part they were removed from, and they usually depart, the more frequently they recur, further and further in their anatomical (becoming more and more rudimental or embryonic in their structure) and physiological characters from the simple tumours which they resemble.

They ulcerate more commonly than the innocent tumours which they resemble in their structure, and they grow quicker, affect the constitution more, and may appear in distant organs—in all of which particulars they differ from innocent tumours; yet their want of complete resemblance to malignant growths is shown in their not producing any distinct cachexia; in their not invading recklessly all the tissues with which they come into contact; in not being infiltrations; and lastly, in not always returning after removal, even though the operation has been repeatedly performed.

The exact nature of a recurrent tumour we can seldom know before its removal; but if an apparently simple tumour grows rapidly, and is softer than usual, and soon protrudes and easily bleeds, we may have every reason to suspect that it will recur if removed. Its actual reappearance, however, is the only certain proof of its character.

These recurrent tumours often appear as if they were the weak expression of an hereditary cancerous taint, as simple tumours occurring in members of cancerous families not unfrequently assume this form.

### C. CANCER.

This is a constitutional as well as a local affection. The growth is composed of structures new to the economy, and peculiar in their organization. The liability to cancerous formations increases with age, and is most observed in females. Medullary cancer occurs at a younger age than the other species, and it is in the eye, the bones, testicle, and limbs, that it is earliest seen. Late in life cancer is most apt to become developed in the digestive organs.

The various forms of cancer may be combined, or one species may follow another, the tendency always being for a more destructive type to appear. The medullary species of cancer is the most malignant and quickly destructive, and the epithelial the least so. All cancers are hereditary to some extent, and all produce, with varying speed, and in different degrees, a cachectic state of the system.

Cancer, in all its forms, consists in its minute structure of certain peculiar and usually readily recognized elements.

There is a basis substance of greater or less cohesion, and a juice of exudation, in which the peculiar cancer cell is found. This cell is variously shaped, being round or oval, or spindle-shaped, or lanceolate and caudate (having sometimes several ends), and enclosing large, regular, compound nuclei, and one, two, or more bright distinct nucleoli. They are combined in the growth with granules and colouring matter in varying proportions. The various multiform elements composing the cancer structure vary in their relative proportion in the different varieties of the disease. They are peculiar to such structures, so far as their combination, number, and arrangement go. Chemically cancers are peculiar, in the great excess of albuminous compounds which they contain, as contrasted with the gelatinous nature of most benign tumours.

**Hard Cancer.**—Generally occurs as an infiltration into the tissues of the affected part, and it is not a little to this anatomical fact that some of the most characteristic features of scirrhus are due. More rarely hard cancer forms distinct tumours.

*Site.*—The mamma before all (see page 352). The bowel, especially the rectum, the sigmoid flexure and ilio-colic valve; the lymphatic glands (generally secondary), skin; periosteum and bone; prostate; muscles; ovary, &c.

Scirrhus may be acute or chronic in its course from first to last, or acute at first and afterwards chronic. When acute it is not only more rapid in its progress than when it is chronic, but it is also softer, and attains a greater size.

Scirrhus is usually hard, heavy, nodular, craggy, and resistant. It is seldom large, but usually steadily increases. In its speed of growth, hardness, size, and painfulness, scirrhus varies considerably. In chronic cases it increases almost imperceptibly; is stony hard, and most incompressible; attains no great size, and causes little or no pain. In acute cases, on the other hand, these conditions are reversed. The growth is rapid, the tumour is tense and elastic, it may reach a great size, and the pain may be atrocious.

Scirrhus draws towards itself the surrounding parts, and welds them into its own substance. The skin is dimpled in consequence of this attraction, and that even when the tumour has not yet approached the surface. In time the integuments become bound to the surface of the growth, and if the tumour is seated in the breast the nipple is retracted. From the same cause, too, the tumour can only be moved *with* the part in which it is seated, and while the superjacent tissues cannot be slid over its surface, it in turn does not glide on the parts lying below. As the skin becomes involved ulceration is established in a variable time.

It is in married females, between forty-five and sixty, that scirrhus is most liable to appear. It is very rare before twenty-five, and it usually chooses robust healthy persons for its attacks. When the constitution is fairly invaded, the anxious, sickly, sallow, leaden hue of the face too plainly proclaims the progress of the disease; and the derangement of the digestive organs which attends it prevents the proper amount of sustenance being taken, and so the strength soon fails.

The sore which forms in the progress of the disease is peculiar. It has usually raised, everted, hard, nodular edges—it is foul and dirty looking—its base is coarsely granular, it tends constantly to augment its area, and a thin irritating ichorous discharge escapes. In this discharge cancer matter largely enters, yet the disease is not destroyed by this constant disintegration, but on the contrary increases the more.

The section of a scirrhous tumour is usually very characteristic. It cuts frequently with a creaking sound. The appearance of the section varies much, according, chiefly, to the degenerations which the tumour has undergone, and the relative proportion of unchanged, or little changed, tissue which it has worked up into its own substance. In typical specimens the surface is of a pale grayish white, or bluish tint—opaline, glistening, and satiny. It is tough, compact, and semi-translucent, and occasionally dashed with purple. It is intersected by glistening bands, and may closely resemble the section of a turnip or unripe pear ("napiform" or "apinoid"). The section becomes concave from its contraction on itself, and this disposition is quite distinctive when well marked. It is not, however, always observed in true scirrhus. It is best developed in old chronic tumours. Hard cancer occasionally appears in the skin. (See p. 354.)

It is by its hard craggy feel; by its history; by the appearance and age of the patient; by the glandular and constitutional implication; by the pain and the ulceration, and microscopic examination of the discharge, that we diagnose scirrhus from such other hard tumours as it may be confounded with.

**Medullary**, soft, or brain-like cancer. Though usually "soft"—considerably more so than the majority of scirrhous growths—yet is occasionally pretty firm—more so than some of the rarer soft forms of scirrhus. Medullary cancer occurs equally as infiltrations and separate tumours. It may be combined with bone (and form the "osteoid" cancer); or with cartilage or cystic formations, or vascular growths ("hematoid cancer"), or epithelial cells ("epithelial cancer"), or pigmental matter ("melanoid cancer").

Medullary is the most malignant form of cancer, and is usually rapidly fatal.

*Site.*—In glands, as the mamma (rare in Great Britain); testicle (comparatively common and typical); parotid, and prostate. It occurs also in the eye, and cavities of the face; lymphatic glands; rectum; uterus; bladder; periosteum, and shafts of bone (rare); articular ends of bones; intestinal tract; serous membranes; sub-cutaneous tissues, and inter-muscular spaces of the limbs.

It is in the eye (especially in the melanotic form); testicle (see p. 441); and limbs, that medullary cancer is perhaps most common as a primary disease.

Medullary cancer occurs often in the young (the maximum of frequence, however, is between 40 and 50); it is rapid in its progress; seldom painful (the amount of pain depends mainly on the part in which it is seated; sometimes there is no pain at all); it quickly and deeply affects the constitution; is frequently multiple in its development; is little liable to ulceration, but bursts the skin, and protrudes as an exuberant bleeding mass, which is very characteristic. Before bursting, the skin gets thin, and permeated by enlarged blood-vessels. Soft cancer may, in rare cases, become arrested in its growth, and may remain stationary, or even wither, or undergo fatty or calcareous degeneration. It may also inflame, suppurate, and slough.

Medullary tumours are usually round or oval, bossy, soft, and very elastic. They may be almost fluctuant at some spots, and firm at others. They often pass deeply between muscles, and may surround bones, blood-vessels, and nerves. The surrounding parts, though adherent to the growth, are not drawn to it as they are in scirrhus. Occasionally (especially in bone), medullary cancer may have a soft pulsation. (See p. 137.)

On section, this cancer looks like fœtal brain, being white, soft, and minutely vascular, and stained more or less, according to the amount of blood effused into its substance. It often appears lobed on section, and occasionally we find it of a firmer consistence than usual, somewhat like brain that has been hardened in spirit. It is very juicy, giving out a creamy fluid, which is readily miscible with water. The appearance of a section of medullary cancer is, however, much diversified by the effects of hæmorrhage, inflammation, degeneration, the presence of cysts, &c.

Medullary cancer may be confounded with various other tumours, and the distinction between it and them is considered with these various affections. Its history, elastic (but not truly fluctuant) feeling; its growth and site; the affection of the glands and constitution; the enlarged veins on its surface; and, if requisite, the effects of puncture with a grooved needle, will enable us to recognize soft cancer. If the cancer has protruded, then a microscopic examination of its debris will differentiate it from any other affection for which it might be mistaken.

**Melanoid Cancer** is just medullary cancer with pigmental matter mingled with it. It is in connection with cutaneous moles that it most commonly forms. On section, the black pigmental matter may appear only as minute spots, hardly, if at all, to be distinguished by the unaided eye; or the whole surface may present one uniform black, brown, or marbled gray colour. The arrangement no less than the amount of the colouring matter, may vary greatly.

**Villous Cancer** may be either a variety of medullary or epithelial cancer. It is a term applied to such cancers when they are composed of fine papillated dendritic filaments.

**Hematoid** is soft and very vascular medullary cancer, whose fine vessels, being ruptured, have allowed free bleeding to take place into its substance, and thus the production of a red mass, which to the eye looks like blood clot.

**Epithelial Cancer.**—This is the most local, least malignant, and least fatal of all cancers. It thus stands at the opposite end of the scale from medullary cancer. It is most common in old men (almost never appears before twenty), and but slowly affects the constitution. It is most quickly fatal when it is seated on the tongue and penis, and least so when it attacks the scrotum and lower limbs. It is most commonly ascribed to oft-repeated irritation of the part.

*Site.*—On (and it may be beneath) the skin and mucous membrane at the orifice of the various internal passages. On the lip and palate; the tongue and inside of the cheeks; on the pharynx and larynx; cardia, rectum, and anus; on the labia, nymphæ, and vagina, the prepuce, scrotum, perineum, and bladder; in the lymphatic glands (rare as a primary disease), skin of the face, eyelids, trunk, and extremities; on scabs and cicatrices, warts and old ulcers; very rarely in internal organs, bones, and the dura mater.

Of all the positions which it selects, it is on the lip, tongue, prepuce, scrotum, and labia that it is most common.

When the skin is affected, and before it ulcerates, it gets hard, firm, and brawny, more sensitive than usual; and this hardening is observed over a considerable area, but does not pass deeply. The surface is smooth or granular, nodular or warty. It may begin as a wart, or as a small sore, or a fissure or crack. The papillæ of the skin or mucous membrane become deformed and enlarged to a greater or less degree, and these are variously grouped and arranged. There are in general deep clefts or fissures between the groups of papillæ, filled with the acrid discharge which exudes, or clogged with crusts, or with the soft, pasty, or scurfy debris. The mass may stand out from the surface in cauliflower-like masses, or even hang by a stem; or it may be somewhat sunk below the level of the surface, and be deeply seated. Generally, however, the diseased portion lies on a level with the surrounding parts. Ulceration takes place, and spreads slowly, and the sore is characteristic. It is round or oval, and scooped out. Its surface is warty, or covered with coarse granulations, which pour out a scanty fœtid discharge, and bleeds easily. The edges and base are hard, and the former are usually nodular, often warty, elevated and everted, and perhaps overhanging. The pain becomes excessive when ulceration has taken place. It is diffused, hot, boring, and most distressing. The constitution long resists the invasion of the disease; but ultimately the glands are affected, and the general health breaks down.

In minute structure these cancers consist mainly of cells, in every way similar to those of tesselated epithelium, as seen in the lips. These cells are infiltrated in a disorderly way into the part. The prevailing cell is round or oval, and thin, with a small bright central nucleus, having rarely a distinct nucleolus.

Epithelial disease is recognized by its site; its arising from some local irritation; its progress by ulceration; its rebelliousness to treatment, and the slow implication of the glands and constitution.

**Osteoid Cancer** is most probably ossified medullary cancer, or at least medullary cancer combined with bony formation. It occurs mostly in adult males. It is very rapid, very malignant, and fatal. Its growth is accompanied by much pain, and it quickly and deeply affects the constitution.

*Site.*—The bones chiefly, as a primary disease, especially the lower end of the femur, the tibia, humerus, skull, pelvis, fore-arm, hand; and secondarily, in the lymphatic glands, internal organs, cellular tissue, and serous membranes.

It grows along the shafts of the long bones, which it seems to enlarge, and it suddenly and characteristically ceases at their extremities. It may project as a tumour from a flat bone. Its surface is smooth or nodular, hard and resistant, rapid and painful in its increase, and soon deeply affects the health.

**Colloid** or alveolar or cystic cancer has the appearance of cells, like honey-comb, inclosing a glue-like or jelly-like substance, soft and semi-diffluent. In its clinical history and physical characters, colloid closely resembles medullary cancer. It is perhaps not so rapid or malignant in its progress as the ordinary form of soft cancer, and it more rarely appears in the young.

*Site.*—The stomach, bowels, uterus, mamma, and periosteum, as a primary affection, and in the lymphatic glands and other parts secondarily. It falls more frequently under the notice of the physician than the surgeon.

The appearance on section will vary with the relative proportion of the fibrous basis substance, and the soft glue-like material which is inclosed in the cells formed by such fibrous stroma; and also by the presence of bleeding, or degeneration, or cysts in the substance of the tumour. The colour and consistence of the colloid material, though generally like yellow glue or honey, may vary very considerably.

In conclusion, then, it may be observed, that innocent and malignant tumours may grow in many organs and tissues; but that certain tumours affect certain parts more than others, and it may be useful, as a step towards their recognition, to epitomize in a general way the different growths which are most apt to appear in the various regions and organs.

*Scalp*—Non-congenital cutaneous cysts.

*Orbit*—Serous, sanguineous, and cutaneous cysts; medullary cancer.

*Antrum*—Cysts, fibrous, recurrent; fibroid, cartilaginous, osseous, fatty, fibro-cellular, myeloid, erectile, encephaloid tumours.

*Gums*—Serous and sanguineous cysts; myeloid, fibrous, and cancerous tumours.

*Lip*—Serous, sanguineous, and proliferous cysts; epithelial cancer.

*Tongue*—Mucous, serous, sanguineous, and cutaneous cysts; erectile, fatty, fibrous, fibro-cellular; medullary and epithelial tumours.

*Jaws*—Cutaneous and dentigerous cysts, fibrous and myeloid tumours.

*Neck*—Serous and sanguineous cysts.

*Lymphatic Glands*—Cancer in all its forms.

*Parotid*—Serous and sanguineous cysts; cartilaginous, fibrous tumours, and medullary cancer.

*Thyroid Gland*—Serous, sanguineous, colloid, and proliferous cysts; myeloid and glandular tumours.

*Skin*—Fibro-cellular outgrowths, epithelial disease, and scirrhus.

*Sub-cutaneous Tissues*—Serous, sanguineous, and proliferous cysts; fibro-cellular, fatty, fibrous, cartilaginous, myeloid, and vascular tumours; medullary and osteoid cancers.

*Inter-muscular Spaces*—Proliferous cysts, fibro-cellular tumours, medullary cancer.

*Mamma*—Serous, sanguineous, oily, colloid, and proliferous cysts; cartilaginous (rare), myeloid, glandular, and fibrous tumours; hard, soft, epithelial, and colloid cancer.

*Labia*—Cysts and epithelial cancer.

*Testicle*—Serous, sanguineous, seminal, and cutaneous cysts; fibro-cellular tumours and medullary cancer.

*Prostate*—Proliferous cysts, scirrhous, and medullary cancer.

*Scrotum*—Fibro-cellular tumours, epithelial disease.

*Spermatic Cord*—Sanguineous and seminal cysts and soft cancer.

*Uterus*—Fibrous and myeloid tumours, and medullary and colloid cancers.

*Ovaries*—Serous, sanguineous, cutaneous, proliferous, and dentigerous cysts; scirrhus and soft cancer.

*Bone*—Serous and sanguineous cysts; fibrous, cartilaginous, myeloid, and osseous tumours; scirrhus, medullary and osteoid cancer.

*Muscle*—Various cysts, scirrhus.

*Nerve*—Cysts, fibrous tumours, soft cancer.

*Mucous Membranes*—Mucous cysts, epithelial disease.

*Rectum*—Fibrous, fibro-cellular, and fatty tumours, and scirrhus, medullary and epithelial cancers.

*Bursæ*—Synovial cysts.

ULCERS, or breaches of surface, resulting from ulcerative action. Ulcers only call for attention here, in order that those broad distinctions between different classes of external sores should be detailed, on the due recognition of which their treatment is founded.

Ulcers may, for practical purposes, be ranked under four classes, each of which presents certain distinctive features.

(1) Healing sores. Simple and uncomplicated ulcers.

(2) Sores failing to heal, or slow to heal, from excess of action.

(3) Ulcers failing to heal, or slow to heal, from defective action.

(4) Ulcers failing to heal, or slow to heal, from peculiarity of action.

The first require merely protection and the simplest applications. The second, as a rule, demand soothing and possibly astringent applications, with rest and elevation. The third, as a rule, demand stimulating appliances, and careful bandaging; and the fourth require remedies according to which of the three foregoing categories they belong to, *plus* such special remedies as are demanded by the peculiarity or specificity present.

Ulcers may, and often do, partake of the characters of all the various classes referred to at different periods of their history, and it is mainly by a careful recognition of the features of the sore at the moment, and the proper interpretation and treatment of these, that the successful management of ulcers is attained.

In judging of the class to which any ulcer belongs, we observe the

(*a*) Shape; (*b*) Depth; (*c*) Edges; (*d*) Surface; (*e*) Granulations; (*f*) Discharge; (*g*) Sensitiveness; and (*h*) State of the surrounding parts.

The age, constitution, state of health, and habits of the patient also throw no small light on the character and proper treatment of an ulcer; and its position (near or distant from the centre of the circulation, its being placed in dependent parts, &c.); the state of the organs of digestion; the nature of the tissues in which the sore is situated (whether they are tense or distensible, vascular or not)—are all points which demand careful examination.

(1) **Characters of a Simple Healing Ulcer.**

(*a*) *Shape* round or oval.

(*b*) *Depth* not great.

(*c*) *Edges* healthy; slightly hyper-vascular. The integuments shelving down, and neither everted, inverted, nor undermined. The epidermis, perhaps, slightly thickened, and having a red zone near the edge, outside of which a delicate, bluish white, opaque line exists, at the union of the sore with the skin.

(*d*) *Surface* of a fresh blood colour, even and regular.

(*e*) *Granulations* numerous, small, acuminated, and firm, which give out a little red blood when roughly touched.

(*f*) *Discharge* laudable pus, and not very abundant.

(*g*) *Sensitiveness*, healthy. Not painful, and yet quite sensitive.

(*h*) *Surrounding parts* healthy.

(2) **Ulcers marked by Excess of Action.**—Under this head are ranked the "inflammatory," "fungous," "exuberant," "irritable" ulcers; also one form of "œdematous," and the "phagedenic," and the "sloughing" ulcers.

(*a*) *Shape* round or irregular.

(*b*) *Depth* varies. It is often considerable. It is sometimes shallow. Occasionally it is of an uneven depth at different parts.

(*c*) *Edges* swollen, abrupt, irregular. Sometimes thick; sometimes thin; often everted and ragged.

(*d*) *Surface* ashy gray. Sometimes red and raw.

(*e*) *Granulations* may be absent altogether, or turgid, and tend to bleed on the least touch.

(*f*) *Discharge* profuse, thin; often bloody and acrid.

(*g*) *Sensitiveness* considerably augmented. Painful; sometimes excessively so. Burning, stinging, boring pain frequently.

(*h*) *Surrounding parts* inflamed, irritable; sometimes œdematous; sometimes dark red and swelled.

These ulcers occur chiefly on the leg, and in persons of full and irritable habits of body; in tipplers, and in the poverty-stricken; in the old, over-worked, and under-fed; and in women at the change of life.

(3) **Ulcers marked by Defect of Action.**—This defect may depend on constitutional or local causes. It frequently arises from bad hygienic conditions, or from the nature of the cause giving rise to the sore, or merely from its long continuance or bad management.

Under this head fall "weak," "atonic," "cachectic," "mucous," "languid," "sluggish," "indolent," and "callous" sores.

(*a*) *Shape* round, oval; often "punched-out" looking.

(*b*) *Depth* varies. It is sometimes deep and concave; sometimes shallow and flat; sometimes elevated.

(*c*) *Edges* frequently well defined. Elevated; often overlaid with dense, white epidermis. Thick, white, dead-looking; or thin, flat, smooth, and glazed. Occasionally they are depressed, inverted, or everted.

(*d*) *Surface* pale, cheesy, brown, or pink.

(*e*) *Granulations* often absent, or defective in quantity, and unhealthy in quality. Large, flabby, semi-translucent, pale, turgid with dark blood, flat or bulbous.

(*f*) *Discharge* scanty, thin, gleety, serous, or bloody; sometimes viscid and fœtid.

(*g*) *Sensitiveness* none. Callous.

(*h*) *Surrounding parts* soft, œdematous, passively congested, sodden, discoloured, often bound down, smooth, shining, and varnished.

These ulcers are most common near the ankle on the lower part of the leg.

(4) **Ulcers characterized by Peculiarity of Action,** which peculiarity may be either in the constitution or in the part.

(1) *Constitution.*—"Syphilitic" (primary, secondary, or tertiary ulcers); "scrofulous;" "vicarious" ("menstrual," "hæmorrhagic"); "cancerous;" "glanderous;" "mercurial;" "gouty;" "scorbutic;" "dyspeptic;" "lupous;" "dartrous." The ulcers which occasionally attend diabetes and Bright's disease of the kidneys also come under this head.

(2) *Local.*—The presence of a foreign body (bone, tendon, dead cellular tissue, &c.), varicose veins, &c. &c.

These ulcers may present features similar to class 1, 2, or 3; but they have other elements *besides and beyond* these which demand treatment. We often recognize this latent complication with ease when it depends on a visible, local cause; but at other times, the past history of the patient, his constitution and habits, have to be carefully inquired into, and the rise and progress of the sore known and studied, before we can judge wherein the *peculiarity* exists.

*Syphilitic sore.*—The primary sore is described at p. 165. The secondary is rarely troublesome or difficult of recognition; but the tertiary is often very easily confounded with others. It follows a pustular or tubercular skin disease, or forms over a gummy tumour. When superficial, it is seen mostly on the face, back of the shoulders, nates, and limbs. It often incloses islands of sound skin within its area. It is irregular in shape, and often heals on one side as it spreads on the other. It is single or multiple, and punched out, that is, having sharp-cut borders. It has well-marked scabs and a dusky circumference. There is also the history of the primary or secondary outbreak, and other evidence of the constitutional disease present, to assist us. Such sores heal under the administration of the hydriodate of potash alone, or combined with proto-iodide of mercury.

*Scrofulous.*—May depend upon a strumous constitutional diathesis, or they may form over a local tubercular deposit. This ulcer occurs on the face, neck, axilla, hips, groin, upper and lower limbs, and near joints. It is a superficial, irregular, worm-eaten sore. It is often large and wide-spread; having blue undermined edges, and a dark, irregular, and weak cicatrix, liable to erosion. The pus is peculiar, curdy, and unhealthy. This sore is very slow and chronic in its course, and is usually multiple. There is evidence of the strumous diathesis in the appearance of the patient, in the glands, &c., and probably outbreaks of the disease elsewhere.

*Vicarious or hæmorrhagic ulcer.*—Occurs in females having deranged or suppressed catamenia. These sores bleed freely, and that chiefly or wholly at the monthly periods.

*Cancerous ulcers* form over a cancerous mass. Sometimes they present a fungous exuberant growth. The edges are thick, hard, warty, irregular, sprouting, everted, and cancerous. The discharge is ichorous, fœtid, and bloody; cancer cells are found under the microscope, and the glands are diseased.

*Glanderous.*—There will be other evidence of the disease. See p. 278.

*Mercurial.*—Irregular, rapidly-spreading sore, with ragged edges, and no hard base or adherent slough.

*Gouty.*—Over gouty deposits, and the deposition of thin, chalky material commonly from the discharge when it dries.

*Scorbutic.*—Tumid, livid sore, with dark, thick, fungous, strongly adherent slough, which is rapidly reproduced, if it is removed, and bleeds easily to the touch.

*Dyspeptic*, *Dartrous*, *Diabetic*, and that accompanying *Bright's disease*, are all recognized by the preceding and accompanying evidence of the affection on which they depend and form a part.

The *Lupous ulcer* occurs mostly on the face or the lip, cheeks, and alæ of the nose. It is usually preceded by pink elevations or tubercles. It passes deeply generally, and may erode cartilage and bone by its slow, progressive, and destructive action.

*Local causes of peculiarity of action* are usually easily recognized. A dead bone or tendon, a musket ball or splinter of wood, enlarged veins, &c., are generally at once seen and appreciated as causes of irritation or weakness.

*Varicose ulcers* almost always occur on the small part of the leg. The surrounding skin soon becomes altered in character; it gets discoloured, brown, or mottled; and the enlarged and often sacculated veins are evident and patent, and if opened by the morbid action, bleed very freely.

**URINE.**—See Hematuria, p. 288; and Purulent Urine, p. 48.

A. **Retention** of urine consists in a partial or complete inability to evacuate the bladder The symptoms produced by it will vary somewhat with the cause giving rise to the affection; with the tolerance of the bladder to the presence and accumulation of urine; with its completeness and the rapidity of its establishment. In some cases, when paralysis of the viscus and loss of sensation exist, the distension may be very great before any annoyance is produced.

The causes on which retention may depend are very numerous, but are referable to—(1) *The bladder itself* ("stagnation" of Civiale), which has lost the power of expulsion; or (2) *an obstacle existing in some part of the passage* leading to the surface ("retention" of Civiale), for example, at the neck of the bladder, prostate, or other part of the urethra.

(1) (*a*) *Paralysis of the bladder* while the neck retains its contractility. This after a time leads to "dribbling with retention." This paralysis may arise from over-distension of the organ; it may follow inflammation, or wounds, or injury to the viscus, as after the operation of lithotomy; injury of the spinal cord or brain (apoplexy); severe injuries of the lower extremities or pelvis, especially fractures of the pubes; it may follow the operation for piles; it may occur in severe fevers, and one form of ague; and it may arise from the abuse of opium injections and cantharides. It also occurs in hysteria and old age.

(*b*) *Foreign bodies* in the bladder—Tumours; polypi; fungous disease; calculus; masses of coagulated blood; accumulated mucus; worms, &c.

(2) *Enlargement of the Prostate.*—Tumours (abscess, cysts, fibrous or cancerous growths), in the pelvis or perineum pressing on the neck of the bladder. Spasm of the neck of the bladder or urethra (caused by cold, irritation in the digestive organs, rectum, or bladder); displacement of the uterus; hernia of the bladder; pregnancy (especially at the fourth month and at full time); prolapsus of the uterus, vagina, or rectum; tumours in the rectum; foreign bodies in it or in the urethra; accumulation of fæces or other matters in the lower part of the gut; tumours or foreign bodies in the uterus or vagina; swelling of the parts around the neck of the bladder or urethra, or infiltrations into them; stricture (congestive, spasmodic, or organic) of the urethra; imperforate prepuce; paraphymosis;

priapism; imperforate hymen; inflammation of the urethra or neck of the bladder, &c.

*Symptoms.*—If inflammatory action is present the pain is sometimes very severe; but if there is no inflammation it may be very slight, and amount more to a feeling of weight in the pelvis. The uneasiness is greatest when the abdominal muscles are contracted, and least when they are relaxed. There is frequent inclination to micturate, attended by much straining, tenesmus, and spasm. A few drops only, or a small quantity of urine is only thrown out with a spasmodic and painful action.

On examining the abdomen, a tumour is found in the middle line, behind the symphysis, rising, it may be, to the ensiform cartilage. It is of a pyramidal shape, broad below and tapering upwards in most cases. Sometimes, however, it is long and narrow, lying up in front of the belly. It is hard, elastic, and circumscribed; dull on percussion, and fluctuant, both by ordinary palpation, and especially on examining it with the finger of one hand in the rectum or vagina, and the other hand laid on the abdomen, or by tapping there gently. By introducing a finger into the rectum beyond the prostate gland, and tapping above the pubes, a wave of fluid may be transmitted from the one hand to the other. It is unaffected by posture, and if not interfered with, goes on increasing in size. There is no urine expelled, as in health, at stated times and in definite quantity. If pressure is made on the tumour the desire to micturate is increased. The tumour is sometimes tender on such pressure. The catheter, if passed, withdraws the urine, and dissipates the tumour. If the retention is not relieved, rigors and pyrexia follow; restlessness, anxiety, vomiting of bilious matter, leading to typhoid symptoms, urinous breath and perspiration, and coma.

In order to distinguish simple retention from mechanical obstruction, and that from paralysis, it is only necessary to introduce the catheter, when the patient is in the recumbent position. In paralysis, it enters easily, and the urine flows out in a continuous stream, unaffected by the contraction of the bladder, but influenced by the respiratory movements alone. The urine, too, is thick, of high specific gravity, and of ammoniacal smell.

Retention of urine has been confounded with ascites and ovarian disease. (See pp. 110 and 372.)

B. **Incontinence**, that is, an involuntary escape of urine from the bladder, may be constant or only occasional (complete or incomplete). It is frequently associated with, and dependent on, retention, and then it results from an overflow of urine. True incontinence depends on the contraction of the sphincter of the bladder being weakened or destroyed. This may depend on many causes; and it is chiefly in directing attention to them that these remarks are made, as the mere recognition of the ailment is too easy to require any description.

To distinguish true incontinence from that which attends retention, it will only be necessary to palpate and percuss the abdomen, or employ the catheter.

It is in young boys, and old men, that incontinence is most common; and in both it may (generally in the latter) be associated with accumulation.

It may be due to feebleness of nervous energy from disease, or injury of the nerve-centres, or from the action of drugs on these centres; to general feebleness of the whole system, as that which succeeds severe illness, or such as occurs in scrofulous children of lax fibre; to injury of the neck of the bladder, as after lithotomy or lithotrity, or the operation for the removal of stone by dilatation in the female; to contusion of the same part from falls or kicks on the perineum; to affections of the neck of the bladder, such as growths (in the prostate gland), foreign bodies, ulcers, pressure on the bladder during pregnancy, or injury of the neck of that organ during delivery; to affections of the bladder itself, as inflammation, irritation, foreign bodies; to morbid states of the urine (especially the lithic acid diathesis); to irritation in the kidney, or in the organs near the neck of the bladder, as the rectum (constipation, worms, piles, &c.), uterus (ulcer on the neck of), vagina; to irritation in the digestive organs, teething, hysteria, phymosis; to a fistula implicating the body or neck of the bladder; to stricture of the urethra, in which the canal is dilated behind, and the constriction of the sphincter destroyed, and the urine constantly escaping through the previous portion of the passage; to the weakening effects of masturbation or inordinate venery, &c. In very stout females it occasionally occurs on any violent exertion or coughing, from the pressure of the abdominal organs and diaphragm. In females, too, it is occasionally due to frequent (especially prolonged) accouchements.

**VEINS.—Phlebitis.**—Inflammation of veins. May be traumatic or spontaneous; and in the latter case, it occurs usually in the lower extremities. When the vein becomes inflamed, the blood within it coagulates, and adheres to the walls of the vessel, coming in this way to block it up more or less completely. This closure may take place throughout a limited or a great extent of the vessel. In certain states of the system this *adhesive* form of the disease does not occur; and when the inflammation is *diffuse*, the clot breaks down, pus forms, and the constitution is contaminated.

Phlebitis may be acute, subacute, or chronic, and the violence of the symptoms will proportionably vary.

(*a*) *Acute Phlebitis* may set in by chills, followed by fever and local inflammation. In superficial vessels the inflammation shows itself by a hard tender cord being felt along the course of the affected veins. It is most apt to occur in vessels which have been previously varicose. There is a dusky redness along the veins, which shades off into the neighbouring parts, and may closely resemble the appearance of erysipelas. On closer examination, knobby enlargements may be discovered at the site of the valves; and the indurated vessels may even in some cases be seen prominent when the part is looked at in profile. The vein is tender to the touch, and all movement of the part aggravates the pain. The circulation in the limb supplied by the affected vein is impeded, and thus congestion occurs, with swelling, which pits on pressure. There are other inconveniencies, also, arising from the same cause, and these vary with the seat of the malady.

The functions of a limb in which the veins are inflamed are impeded; and those vessels which are not implicated in the disease, may become enlarged from the extra duty thrown upon them.

Phlebitis of deep vessels is very difficult to recognize. It is by the enlargement of the superficial vessels—by the brawny, porky, often white and tense state of the limb—by the feeling of weight and general uneasiness experienced by the patient, that we are guided, and even then the distinction from inflammation of the deep lymphatics cannot always be made.

(*b*) *In Chronic Phlebitis* the veins are permanently thickened and rigid. There is weight and discomfort in the part, with a feeling of heat and fulness. The circulation is embarrassed, and there is pain on pressure.

If the phlebitis is diffuse, or if pus forms within the veins, and is not circumscribed, but enters the circulation, then symptoms of pyæmia (which see) will become developed.

Phlebitis is distinguished from *angeioleucitis* by the greater size of the veins than the lymphatic vessels; their less tortuous and intercrossing course; their direction; and their not being traceable into glands; by their deeper position; fewer number; and there being no glandular affection.

There is no other affection with which phlebitis can be confused.

**Air in Veins.**—During operations about the root of the neck and axilla, when a large vein is opened in such a way that it is prevented from collapsing; or when from disease in the coats of a vessel, or the mode of its attachment to a growth or to surrounding parts, its closure is obstructed, then air may enter so as to cause rapid, if not instant, death by its action on the heart and lungs. An empty state of the veins favours the occurrence of this accident, and it is most apt to take place if at the moment the vessel is opened a deep inspiration is made, whereby a suction action is exercised on the great veins situated in the region where the flux and reflux of the blood exists—*i.e.* near the thorax. It is when the head is thrown too far back or the arms extended, that this suction is most powerful. When in the dissection of the deep connections of cervical tumours they are drawn forwards and downwards, a piece of the vein is apt to be scooped out, and in such circumstances air is very likely to enter.

The evidence we have of this accident having occurred is sufficiently distinctive. A sucking, hissing, whistling, lapping, or gurgling sound is heard in the part, and bubbles of air are seen at the aperture in the vessel mixed with the blood. The character of the sound varies with the freedom of the opening. It is broken and disjointed, and so expressive of its cause (when marked) that even those who have never heard of the possible occurrence of such an accident recognize the fact that air is rushing into some aperture in the wound. Appalling faintness, and it may be fatal syncope, follow, if the air has been rapidly admitted and in quantity. Convulsions may precede death, or with a cry expressive of anticipated death instant dissolution follows. Otherwise the pulse gets rapid and almost inappreciable, the heart acts tremulously and feebly, and a single or double bruit, and even a gurgling, accompanying the heart sounds, is said to have been detected. In animals abnormal clearness on percussion over the heart has also been observed. If the patient survive these effects, he will probably suffer from fatal pneumonia.

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